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Vol. II

TRANSCRIPT OF RECORD

Supreme Court of the United States

OCTOBER TERM, 1934

No. 102

SAMUEL B. SMITH, PETITIONER,

vs.

E. H. SNOW AND E. H. SNOW, DOING BUSINESS AS SNOW'S HATCHERIES AND SNOW'S INCUBATOR COMPANY.

ON WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE EIGHTH CIRCUIT.

PETITION FOR CERTIORARI FILED JUNE 11, 1934.

CERTIORARI GRANTED OCTOBER 8, 1934.

United States Circuit Court of Appeals
EIGHTH CIRCUIT.

No. 9757

IN EQUITY.

E. H. SNOW, AND E. H. SNOW DOING BUSINESS AS SNOW'S HATCHERIES AND SNOW'S INCUBATOR COMPANY, APPELLANTS,

vs.

SAMUEL B. SMITH, APPELLEE.

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES FOR THE DISTRICT OF MINNESOTA.

FILED MAY 29, 1933.

INDEX.

	Original	Print
Bill of Complaint	1	1
Bill of Particulars	6	4
Answer as Amended	7	5
Order that Defendants prepare further and better statement specifying patents, etc., upon which they will rely	19	16
Acknowledgment of Service of Response of Defendants	20	17
Response of Defendants to Order directing them to prepare further and better statement specifying patents, etc., upon which they will rely	21	18

	Original	Print
Stipulation as to Introduction of uncertified copies of letters patents, etc	24	20
Opinion of District Court	973	20
Decree, February 11, 1933	979	24
Petition for Appeal and allowance thereof	982	26
Bond on Appeal	984	27
Assignment of Errors	986	29
Citation and Admission of Service	999	42
Stipulation for extension of time to file Transcript	1001	43
Order extending time to file Transcript	1001	43
Stipulation for further extension of time to file Transcript	1002	44
Order further extending time to file Transcript	1002	44
Stipulated Praecipe for Transcript	1003	44
Approval of Praecipe by District Judge	1011	54
Stipulation that certain exhibits be sent to Circuit Court of Appeals as original exhibits and Order granting same	1012	54
Statement of Evidence	26	55
Caption	26	55
Testimony for Plaintiff	27	56
Joseph I. Taggart	27	56
Harry B. Perkins	155	131
Earl H. Snow	158	133
Joseph I. Taggart, recalled	158	133
Testimony for Defendants	159	134
Samuel B. Smith	159	134
E. H. Snow	167	140
Nora Snow	245	181
Frank B. Rowley	246	182
Testimony for Plaintiff in Rebuttal	571	375
Lena Laux	571	375
Clarence J. Holmes	599	391
Malcolm G. Reynolds	601	392
Harold E. Davis	603	394
Joseph I. Taggart	606	396
Testimony for Defendants in surrebuttal	636	414
Nora Snow	636	414

Index, Volume 2

Plaintiff's Exhibits	654	425
1, Letters Patent No. 1,262,860 to S. B. Smith, April 16, 1918	654	425
2, Chart showing days of incubation	661	433
3, Record of heat development in eggs of common fowl	662	435
4, Photograph of eggs attached to Exhibit 3	663	437
5, Pencil sketches showing circuits of air	664	439
6, Photograph showing front and side of Smith Commercial Machine	665	441
6-A, Photograph of front view of Smith Commercial Machine	666	443
6-B, Photograph of interior front view of Smith Commercial Machine	667	445
6-C, Photograph of interior side view of Smith Commercial Machine	668	447
7, 7-A and 7-B, Scale drawings showing interior sectional views of Smith Commercial Machine	669	449
8, 8-A and 8-B, Snow Advertisements (Original exhibits)	672	455

	Original	Print
9, Contract for purchase of Snow Machine by Ralph Hopkins from Snow Incubator Company, July 3, 1931	673	457
10, Photograph of front view of Snow Machine	674	459
10-A, Photograph showing front and side view of Snow Machine.	675	461
10-B, Photograph of interior front view of Snow Machine	676	463
10-C, Photograph of interior side view of Snow Machine	677	465
10-D, Photograph of interior of Snow Machine with side trays removed	678	467
10-E, Photograph of detailed view hatching rack of Snow Machine	679	469
11, Catalogue of Robbins Incubator Company (Original exhibit)	680	471
12 to 12-KK, Photographs of Taggart's test data sheets relating to Snow Machine	681	473
13 to 13-KK, Colored photographs of test data sheets relating to Snow Machine	692	495
15, Drawing of Taggart's Scale of Snow's Sleepy Eye Machine.	701	513
18, Contract for purchase of incubator by E. H. Snow from Smith Incubator Company, June 13, 1925	702	515
19, Tabulation of incubators sold by Smith and Buckeye Companies	703	517
20, Letter, E. H. Snow to Dr. S. M. Smith, October 30, 1924	704	519
21, Letter, Smith Incubator Company to E. H. Snow, November 4, 1924	705	521
22 and 23, Colored Diagrams of Rowley's Test Data sheets	706	523
14, Model (Original exhibit)	708	527
Defendants' Exhibits	709	529
A, Page from Cleveland "Sunday Plain Dealer" of February 23, 1913	709	529
B, Page from "Cleveland Leader" of February 22, 1914	710	531
C, Sketch—Snow's egg setting	711	533
D-1 to D-5, Photographs of Different view of Snow Machine	712	535
D-1, Interior from doorway—One water pan removed	712	535
D-2, Interior from doorway—Both water pans in place	713	537
D-3, Interior—Some trays removed—showing one agitator	714	539
D-4, Exterior view of front	715	541
D-5, Exterior view of front and side	716	543
E-1 to E-3, Photographs of different views of Sleepy Eye Machine	717	545
E-1, Photograph of interior view from door	717	545
E-2, Photograph of interior view from door with Mr. Snow in corridor	718	547
E-3, Exterior view	719	549
G-1 to G-3, Photographs of different views of Snow's Smith Machine	720	551
G-1, Name plate on door	720	551
G-2, Interior view from doorway	721	553
G-3, Interior view from doorway with one fan panel dropped.	722	555
J-1 and J-2, Diagrams of Rowley's Test Smith Machine	723	557
L-1 to L-5, Drawings of Snow Incubator	725	561
L-1, Front elevation	725	561
L-2, Side elevation	726	563
L-3, Longitudinal Section	727	565
L-4, Cross-Section	728	567
L-5, Details of Incubator	729	569

	Original	Print
M-1 to M-7, Diagrams of Rowley's Test Data of Snow Machine.	730	571
N-1 to N-3, Pencil sketch of Rowley's Test Data of Snow's Sleepy-Eye Machine	737	585
O, File Wrapper and Contents of Smith Letters Patent in suit, Memorandum as to	740	591
P, Letters Patents	741	593
United States Letters Patents	741	593
No. 120,253 to H. Endemann, October 24, 1871	741	593
No. 152,644 to E. A. Jones and C. W. Jones, June 30, 1874.	745	597
No. 272,744 to A. H. Morgan, February 20, 1883	751	603
No. 286,756 to C. F. Winkler, October 16, 1883	758	609
No. 297,676 to G. Conant, April 29, 1884	768	619
No. 330,457 to C. Bassini & A. Heyden, November 17, 1885.	771	623
No. 344,474 to J. W. Campbell, June 29, 1886	778	631
No. 559,676 to T. R. C. Christianson, May 5, 1896	784	637
No. 591,870 to F. H. Morgan, October 19, 1897	794	647
No. 691,837 to V. S. Bell, January 28, 1902	802	655
No. 709,650 to O. P. Scott, September 23, 1902	808	661
No. 745,458 to F. C. Perkins, December 1, 1903	814	667
No. 828,181 to G. H. Boyd, August 7, 1906	824	677
No. 891,019 to L. Verna, June 16, 1908	831	683
No. 916,454 to V. C. Koons, March 30, 1909	836	689
No. 949,653 to J. H. Klinke, February 15, 1910	852	705
No. 1,100,146 to J. O. Olson, June 16, 1914	858	711
No. 1,137,752 to G. E. Goldstein, May 4, 1915	862	715
No. 1,160,793 to S. S. Van Keuren, November 16, 1915	866	719
German Letters Patent No. 155917 to E. Stulik, November 7, 1901	875	729
Translation of German Letters Patent	878	737
United States Letters Patents	883	745
No. 3,019 to N. E. Guerin, March 30, 1843	883	745
No. 360,223 to E. H. Johnson, March 29, 1887	894	757
No. 426,321 to J. K. Proctor and J. H. Knowles, April 22, 1890	901	765
No. 843,909 to F. M. Peters and H. H. Hungerford, February 12, 1907	908	773
No. 992,622 to J. Wiebe, May 16, 1911	914	779
No. 1,010,809 to J. Schmidt and H. Schutterle, December 5, 1911	918	783
No. 1,075,747 to C. W. Zimmer, October 14, 1913	930	795
Q, Cover and Pages 652 and 653 of Ure's Dictionary of Arts, Manufactures and Mines	940	805
R, Pages 2704 and 2705 of Knight's American Mechanical Dictionary	943	811
S, Sketch of Compartment of Smith's 1913 and 1914 Machine.	945	815
T, Letters Patent No. 535,175 to C. W. Schwartz, Jr., March 5, 1895	946	817
U, Interior view of Incubator of E. H. Snow	962	833
V, Letters Patent No. 1,562,787 to I. M. Petersime, November 24, 1925	963	835
Plaintiff's Exhibits 16 and 17, Models (Original exhibits)	971	843
Defendants' Exhibits F and H, Models (Original exhibits)	971	843
Stipulation of Counsel approving Statement of Evidence	972	843
Approval of Statement of Evidence by District Judge	972	843

	Original	Print
Clerk's Certificate to Transcript	1013	844
Stipulation to forward Defendant's Exhibit O, File Wrapper and Contents of Letters Patent No. 1,262,860 to S. B. Smith, April 16, 1918 to United States Circuit Court of Appeals, and that copies thereof be included in printed record	1	844
Order of United States District Judge approving stipulation	2	846
File Wrapper and Contents of Letters Patent No. 1,262,860 to S. B. Smith, April 16, 1918	3	847
Record of filings	3	847
Letter to Commissioner of Patents, October 24, 1916	3a	849
Petition	4	851
Specification	4	851
Oath	14	871
Communication from Commissioner of Patents, November 1, 1916	15	873
Letter to Commissioner of Patents, March 3, 1917	18	879
Communication from Commissioner of Patents, March 24, 1917	21	885
Letter to Commissioner of Patents, April 5, 1917	25	893
Communication from Commissioner of Patents, April 12, 1917	28	899
Letter to Commissioner of Patents, April 20, 1917	30	903
Communication from Commissioner of Patents, May 3, 1917	34	911
Letter to Commissioner of Patents, June 13, 1917	35	913
Letter to Commissioner of Patents, June 26, 1917	36	915
Communication from Commissioner of Patents, June 30, 1917	39	921
Letter to Commissioner of Patents, February 9, 1918	41	925
Affidavit of Samuel B. Smith	45	933
Affidavit of George Cugley	46	935
Drawings 1 to 5	49	941
Drawings A to E	54	951
Letter to Commissioner of Patents	59	961
Communication from Commissioner of Patents advising of allowance of patent, March 12, 1918	60	963
Letter to Commissioner of Patents	61	965
Contents	62	967
Letters Patent No. 1,262,860 to S. B. Smith, April 16, 1918	64	971
Certificate of Clerk to Stipulation	70	981
Proceedings in U. S. Circuit Court of Appeals	982	982
Appearance of Mr. Ralph E. Williamson as Counsel for Appellants	982	982
Appearance of Mr. James F. Williamson as Counsel for Appellants	982	982
Appearance of Mr. A. L. Ely as Counsel for Appellee	983	982
Appearance of Mr. A. C. Paul as Counsel for Appellee	983	983
Appearance of Mr. Maurice M. Moore as Counsel for Appellee	983	983
Order of Argument	984	983
Order of Submission	984	983
Opinion, U. S. Circuit Court of Appeals	985	984
Decree, U. S. Circuit Court of Appeals	994	991
Petition of Appellee for Rehearing	995	993
Letters Patent No. 1,728,980, to John L. Robbins, Sept. 24, 1929	1002	1002
Order denying Petition for Rehearing	1005	1005
Petition for Stay of Mandate	1005	1005
Order Staying Issuance of Mandate	1006	1005
Clerk's Certificate to Transcript	1007	1006
Order allowing certiorari		1007

654

(Plaintiff's Exhibit 1.)
(Letters Patent No. 1,262,860 to S. B. Smith,
April 16, 1918.)

426

S. B. SMITH.

INCUBATOR.

APPLICATION FILED OCT. 26, 1916.

1,262,860.

Patented Apr. 16, 1918.

2 SHEETS—SHEET 2.

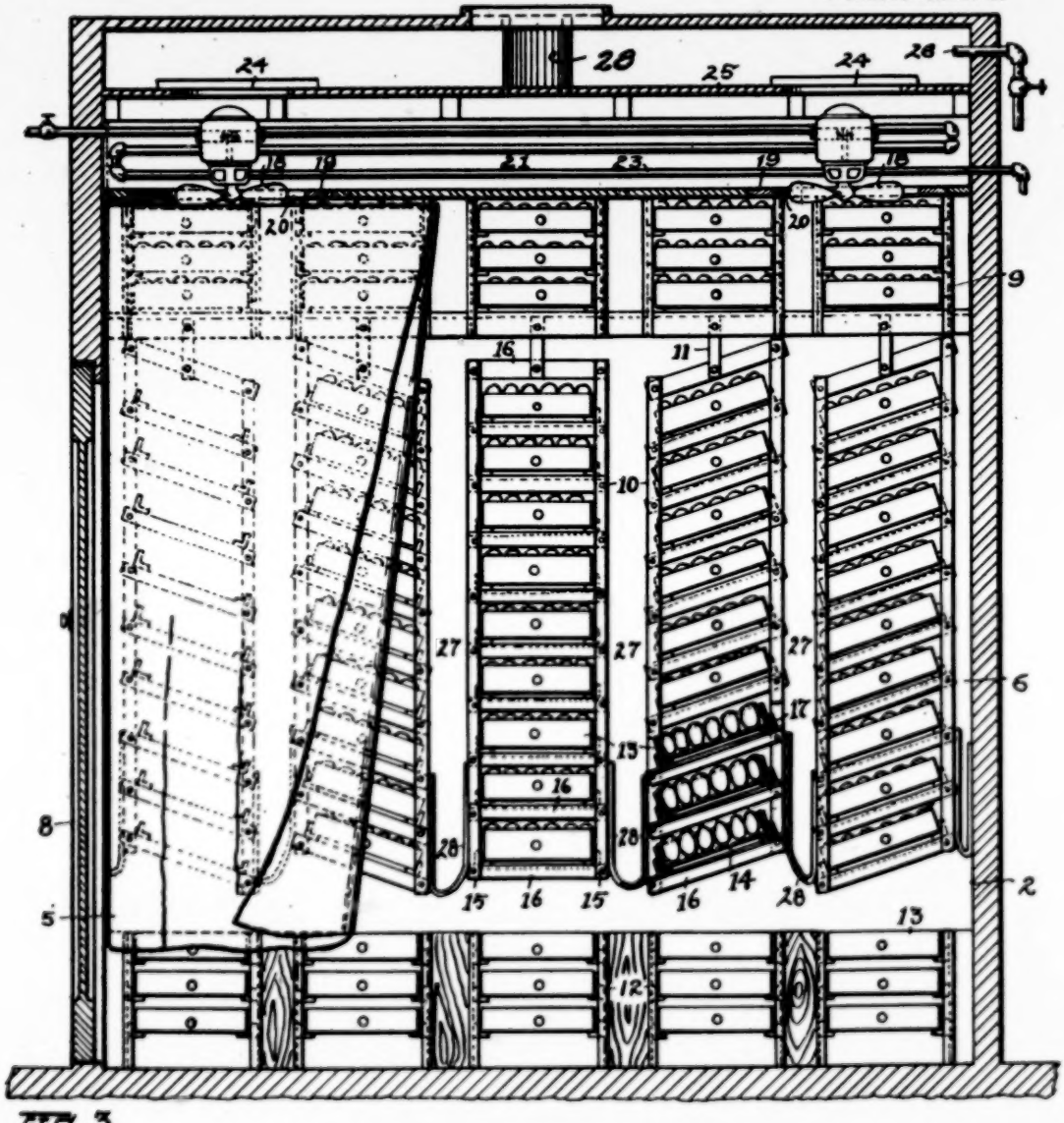

FIG. 3

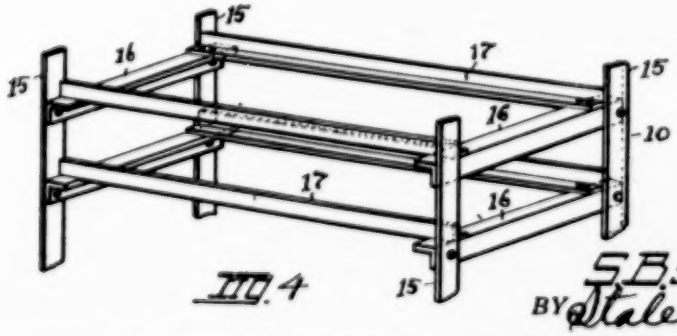

FIG. 4

INVENTOR.

S. B. SMITH.

BY Staley & Bowman

428

S. B. SMITH.

INCUBATOR.

APPLICATION FILED OCT. 26, 1916.

1,262,860.

Patented Apr. 16, 1918.

2 SHEETS—SHEET 1.

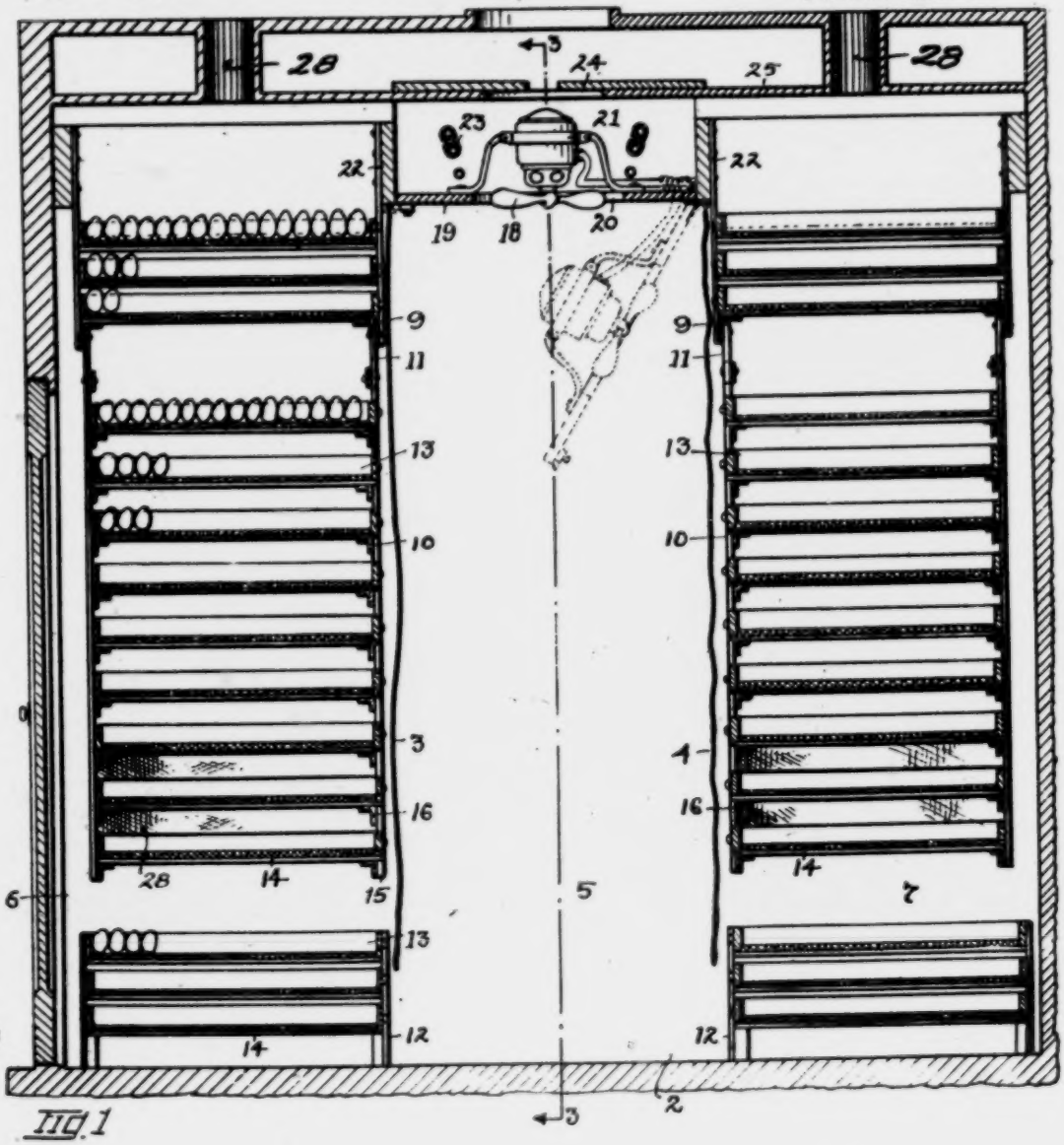

FIG. 1

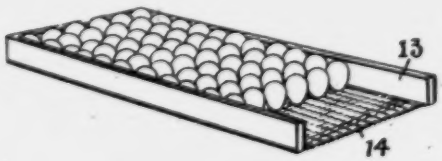

FIG. 2

INVENTOR.
S. B. SMITH.
BY Staley & Bowman
ATTORNEYS

UNITED STATES PATENT

SAMUEL B. SMITH, OF CLEVELAND, OHIO, ASSIGNOR TO THE B
OF SPRINGFIELD, OHIO, A CORPORATION OF

INCUBATOR.

1,262,860. Specification of Letters Patent. Pa

Application filed October 26, 1916. Serial No. 127,

To all whom it may concern:

Be it known that I, SAMUEL B. SMITH, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Incubators, of which the following is a specification.

The improved apparatus and method, is particularly designed for extensive operations wherein a chamber of large dimensions is adapted to contain thousands of eggs in separate trays arranged in tiers and the method of heating is such that the heated air is adapted to the eggs in various stages of incubation. There is a forced circulation of hot air through the chamber which is adapted preferably to maintain all eggs at temperatures between 100° and 105° Fahrenheit approximately and this improved system contemplates that fresh eggs will be placed in a horizontal plane, preferably by means of trays supported in horizontal planes, and after the eggs have been subject to the circulation of hot air for a predetermined time (the air circulating largely around the eggs) they will be placed in a tilted or inclined position in a different location but still subject to the same column of air and at this period of incubation they will be tilted in different planes at regular intervals during the time they remain in this latter position, and after they have remained for a predetermined time they will be again moved to a different position with reference to the forced circulation of hot air and so placed therein that the air will tend to keep the eggs below 105° temperature, and in this last named position the air will be forced to pass between the different eggs and will in effect act as a cooling medium for the eggs. The temperature of circulating air should be such as will prevent the eggs in the early stage of incubation from falling below 100° and the speed or velocity of the circulating air should be such as to carry the heat away from the eggs in the later stage of incubation and thereby hold the temperature of those eggs at 105° or slightly below that. It is manifest that the temperature will remain practically the same throughout the column of eggs, but the air is impelled with sufficient velocity to carry the heat away from the eggs which happen to be in the advanced stage of incubation.

In the accompan
Figure 1 is a cro
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Fig. 2 is a pers
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clearly disclose th
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Fig. 4 is a per
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and 7. Entrance
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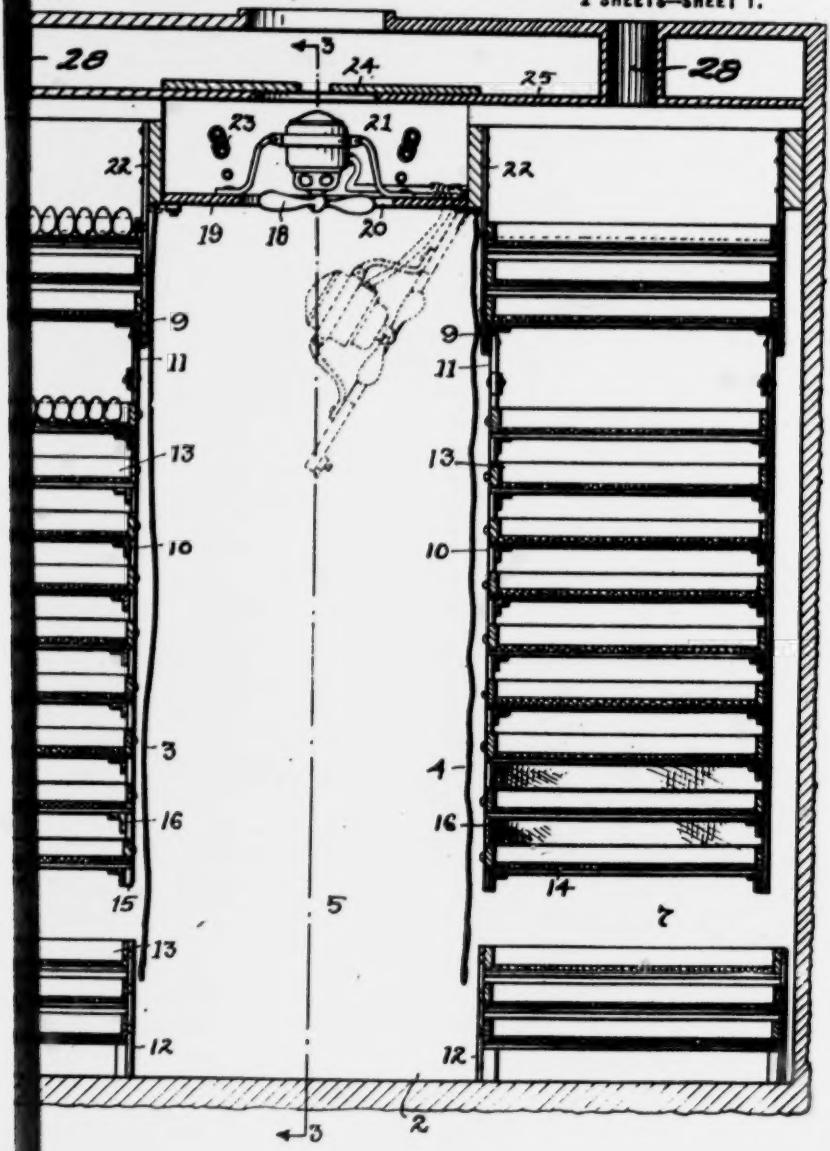
S. B. SMITH.

INCUBATOR.

APPLICATION FILED OCT. 26, 1916.

Patented Apr. 16, 1918.

2 SHEETS—SHEET 1.



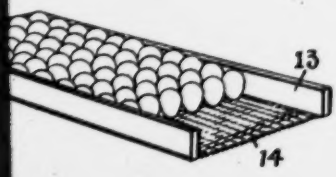


FIG. 2

INVENTOR.
S. B. SMITH.
BY Staley & Bowman
ATTORNEYS

SAMUEL B. SMITH, OF CLEVELAND, OHIO, ASSIGNOR TO THE BUCKEYE INCUBATOR CO., OF SPRINGFIELD, OHIO, A CORPORATION OF OHIO.

INCUBATOR.

1,262,860. Specification of Letters Patent. Patented Apr. 16, 1918.

Application filed October 26, 1916. Serial No. 127,915.

To all whom it may concern:

Be it known that I, SAMUEL B. SMITH, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Incubators, of which the following is a specification.

The improved apparatus and method, is particularly designed for extensive operations wherein a chamber of large dimensions is adapted to contain thousands of eggs in separate trays arranged in tiers and the method of heating is such that the heated air is adapted to the eggs in various stages of incubation. There is a forced circulation of hot air through the chamber which is adapted preferably to maintain all eggs at temperatures between 100° and 105° Fahrenheit approximately and this improved system contemplates that fresh eggs will be placed in a horizontal plane, preferably by means of trays supported in horizontal planes, and after the eggs have been subject to the circulation of hot air for a predetermined time (the air circulating largely around the eggs) they will be placed in a tilted or inclined position in a different location but still subject to the same column of air and at this period of incubation they will be tilted in different planes at regular intervals during the time they remain in this latter position, and after they have remained for a predetermined time they will be again moved to a different position with reference to the forced circulation of hot air and so placed therein that the air will tend to keep the eggs below 105° temperature, and in this last named position the air will be forced to pass between the different eggs and will in effect act as a cooling medium for the eggs. The temperature of circulating air should be such as will prevent the eggs in the early stage of incubation from falling below 100° and the speed or velocity of the circulating air should be such as to carry the heat away from the eggs in the later stage of incubation and thereby hold the temperature of those eggs at 105° or slightly below that. It is manifest that the temperature will remain practically the same throughout the column of eggs, but the air is impelled with sufficient velocity to carry the heat away from the eggs which happen to be in the advanced stage of incubation.

In the accompanying drawings:

Figure 1 is a cross section of my improved incubator.

Fig. 2 is a perspective view of one of the egg trays with one end removed to more clearly disclose the open mesh bottom.

Fig. 3 is a vertical section of the incubator on line 3—3, Fig. 1.

Fig. 4 is a perspective view of a portion of one of the tilting racks for the trays.

The invention comprises a walled chamber 2 corresponding in size to that of an ordinary room, say approximately nine feet high, eight to ten feet wide, and of any desired length, and this chamber is subdivided longitudinally by two parallel rows of curtains 3 and 4 to provide a central compartment or corridor 5 and side compartments 6 and 7. Entrance to the corridor is gained by a door 8, and the compartments behind the curtains contain elevated stationary racks 9 which are within convenient reach of the attendant for introducing the fresh supply and from which elevated position the trays may be shifted at the proper time to a tier of tilting racks 10 on a lower plane and suspended therefrom by links 11. A series of stationary racks 12 are also arranged beneath the tilting racks 10, and all of said racks are of open construction and of the same size to permit interchange of the shallow trays 13 for the eggs to be hatched. These trays are provided with open mesh bottoms 14 upon which the smaller ends of the eggs rest in close and solid formation, and each tray of eggs occupies the upper rack 9 for the first three days, and is then transferred to a place in the upper end of the tilting rack 10. During the next fifteen days the trays in the tilting rack are shifted from higher to lower planes therein and tilted at frequent intervals to stand in oppositely-inclined positions. The tilting of the eggs is preferably arranged to put the eggs substantially on their sides. When the eggs in the lower-most trays in the tilting racks 10 are about ready to hatch each tray is transferred to the stationary rack 12 where the chicks may be removed as occasion requires.

Each tilting rack 10 comprises perpendicular corner bars 15 pivotally united by a series of cross bars 16 carrying connecting angle irons 17 extending from front to rear

at each side and upon which the trays are adapted to be slidably supported. The links 11 are pivotally connected at the center of the uppermost cross bars 16 of each tilting rack, thus permitting an entire series of trays to be placed in an inclined position by merely raising or lowering one side of the rack by hand engagement. The weight and friction and balance of the parts cause the trays to remain in any shifted position, whether horizontal or inclined. The fans or series of fans 18 mounted upon the hinged trap doors 19 forming the ceiling of the central corridor 5 constitute the means for forcing the hot air through the chamber and there are circular openings 20 provided in said doors within which the fans are arranged properly. The longitudinal space 21 above the fans has open communication above the side walls 22 with the upper ends of the rack compartments behind the curtains 3 and 4 and these curtains extend a sufficient distance, as indicated in Fig. 1, to cause the heated air distributed by the fans to pass downwardly through the central corridor to a point near the bottom of the chamber where it can pass into the space occupied by the trays. As explained later the trays near the bottom are preferably arranged so that the air is forced to pass between the eggs in each tray thereby cooling or holding the temperature of those eggs down. Thence the air passes into spaces above the lower series of trays until it reaches the distributing space 21 above the fan. Coils of heating pipe 23 are arranged in the space 21 to heat the air and more or less fresh air may be taken in through the valved opening 24 above the space 21 and this fresh supply of air may be charged with steam to a greater or less degree by means of a valve controlled jet or pipe 26 see Fig. 3. The outlets 28 for the release of foul air are made of such restricted capacity as to prevent the undue escape of moisture. It is possible to limit the openings and so conserve the moisture by reason of the vitalizing effect of the power driven current upon the body of the air within the chamber. By lowering the hinged trap doors, the motor and fan are also easily reached for inspection, etc.

In Fig. 3 only a single curtain 3 is shown in place, the curtain or curtains at the right being entirely removed to disclose the racks and trays in full lines, and it will be also noted that the vertical spaces 27 between the adjacent tilting racks 10 are closed at their lower ends by flexible strips of fabric which are attached to and extend upward at each side of each rack so as to compel the air to circulate through the mesh bottom and around and about each egg as heretofore referred to, and as the eggs further advanced in incubation are contained in these lower trays and as the danger is that the temperature will rise in these eggs to a point injurious to incubation the improved method disclosed herein permits the circulating air to act as a medium to prevent the over heating at this stage of incubation and this is accomplished by promoting an induced draft within the lower trays. It is obvious that the fans can be so arranged and can be operated at such speed as to cause the hot air to circulate fast enough to keep the temperature throughout the chamber between the limits of 100° and 105°.

It, therefore, appears that the improved apparatus and method contemplates the application of hot air circulating in a column with such speed as to keep the temperature substantially uniform and so arranging the eggs that the fresh eggs are placed at one point in the column of air and held in a horizontal plane until they reach a predetermined stage of incubation and then put at a different point in the same column of air and kept in planes inclined to the horizontal and thereafter placed at such a point in the column of air that the forced draft of air acts to hold the eggs at a uniform temperature and to prevent them from becoming overheated and thereafter placing the eggs into final position for the hatching operation.

Any suitable thermostatic means may be employed for regulating the temperature, such for instance as a thermostat commonly employed in incubators of a well-known construction and illustrated in Letters-Patent No. 1,111,138, dated September 22nd, 1914, which thermostat may be suitably connected to the valve controlling the steam or hot water, as the case may be, which passes through the pipes 23.

Having thus described my invention, I claim:—

1. The method of hatching a plurality of eggs by arranging them at different levels in a closed chamber having restricted openings of sufficient capacity for the escape of foul air without undue loss of moisture and applying a current of heated air, said current being created by means other than variations of temperature and of sufficient velocity to circulate, diffuse and maintain the air throughout the chamber at substantially the same temperature, whereby the air will be vitalized, the moisture conserved and the units of heat will be carried from the eggs in the more advanced stage of incubation to those in a less advanced stage for the purpose specified.

2. The method of hatching a plurality of eggs by arranging them at different levels in a closed chamber having restricted openings of sufficient capacity for the escape of foul air without undue loss of moisture and applying a power driven current of heated

air in an adjacent chamber through openings into the egg chamber, said current being of sufficient velocity to circulate, diffuse and maintain the air throughout the egg chamber at substantially the same temperature, whereby the air will be vitalized, the moisture conserved and the units of heat will be carried from the eggs in the more advanced stage of incubation to those in a less advanced stage for the purpose specified.

3. The method of hatching a plurality of eggs by arranging them at different levels in a closed chamber having restricted openings of sufficient capacity for the escape of foul air without undue loss of moisture and applying a vertically directed current of heated air in an adjacent chamber to circulate in said egg chamber through upper and lower openings between said chambers, said current being created by mechanically moving means of such velocity as to diffuse and maintain the air throughout the egg chamber at substantially the same temperature whereby the air will be vitalized, the moisture conserved and the units of heat will be carried from the eggs in the more advanced stage of incubation to those in the less advanced stage for the purpose specified.

4. In an incubator, a closed chamber having a central corridor provided with an air-

distributing space i
a power-driven fan
at each side of sai
permit the air to ci
of the chamber into
behind the curtains,
the air distributing
and the parts of s
curtains, separate
racks behind said c
open-mesh bottom
upon said racks, a
circulated through

5. In an incubato
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In testimony wh
my hand this 20t

Witnesses:
HANNAH D
IDA M. SMI

lower trays and as the danger is that the temperature will rise in these eggs to a point injurious to incubation the improved method disclosed herein permits the circulating air to act as a medium to prevent the over heating at this stage of incubation and this is accomplished by promoting an induced draft within the lower trays. It is obvious that the fans can be so arranged and can be operated at such speed as to cause the hot air to circulate fast enough to keep the temperature throughout the chamber between the limits of 100° and 105°.

It, therefore, appears that the improved apparatus and method contemplates the application of hot air circulating in a column with such speed as to keep the temperature substantially uniform and so arranging the eggs that the fresh eggs are placed at one point in the column of air and held in a horizontal plane until they reach a predetermined stage of incubation and then put at a different point in the same column of air and kept in planes inclined to the horizontal and thereafter placed at such a point in the column of air that the forced draft of air acts to hold the eggs at a uniform temperature and to prevent them from becoming overheated and thereafter placing the eggs into final position for the hatching operation.

Any suitable thermostatic means may be employed for regulating the temperature, such for instance as a thermostat commonly employed in incubators of a well-known construction and illustrated in Letters-Patent No. 1,111,138, dated September 22nd, 1914, which thermostat may be suitably connected to the valve controlling the steam or hot water, as the case may be, which passes through the pipes 23.

Having thus described my invention, I claim:—

1. The method of hatching a plurality of eggs by arranging them at different levels in a closed chamber having restricted openings of sufficient capacity for the escape of foul air without undue loss of moisture and applying a current of heated air, said current being created by means other than variations of temperature and of sufficient velocity to circulate, diffuse and maintain the air throughout the chamber at substantially the same temperature, whereby the air will be vitalized, the moisture conserved and the units of heat will be carried from the eggs in the more advanced stage of incubation to those in a less advanced stage for the purpose specified.

2. The method of hatching a plurality of eggs by arranging them at different levels in a closed chamber having restricted openings of sufficient capacity for the escape of foul air without undue loss of moisture and applying a power driven current of heated

air in an adjacent chamber through openings into the egg chamber, said current being of sufficient velocity to circulate, diffuse and maintain the air throughout the egg chamber at substantially the same temperature, whereby the air will be vitalized, the moisture conserved and the units of heat will be carried from the eggs in the more advanced stage of incubation to those in a less advanced stage for the purpose specified.

3. The method of hatching a plurality of eggs by arranging them at different levels in a closed chamber having restricted openings of sufficient capacity for the escape of foul air without undue loss of moisture and applying a vertically directed current of heated air in an adjacent chamber to circulate in said egg chamber through upper and lower openings between said chambers, said current being created by mechanically moving means of such velocity as to diffuse and maintain the air throughout the egg chamber at substantially the same temperature whereby the air will be vitalized, the moisture conserved and the units of heat will be carried from the eggs in the more advanced stage of incubation to those in the less advanced stage for the purpose specified.

4. In an incubator, a closed chamber having a central corridor provided with an air-distributing space in its upper portion and a power-driven fan in said space, curtains at each side of said corridor, arranged to permit the air to circulate from the bottom of the chamber into the part of the chamber behind the curtains, passageways connecting the air distributing space with the corridor and the parts of said chamber behind the curtains, separate stationary and tilting racks behind said curtains, egg-trays having open-mesh bottoms removably mounted upon said racks, and means to heat the air circulated through said chamber.

5. In an incubator, a closed chamber with a vertically disposed partition to provide a corridor having upper and lower passage ways to said chamber, egg trays arranged at different levels in said chamber, a power driven fan creating a current in said corridor to circulate through said passage ways and egg trays, said chamber having restricted openings of sufficient capacity for the discharge of foul air without undue loss of moisture and means to heat the air circulated through said chamber.

In testimony whereof, I have hereunto set my hand this 20th day of October, 1916.

SAMUEL B. SMITH.

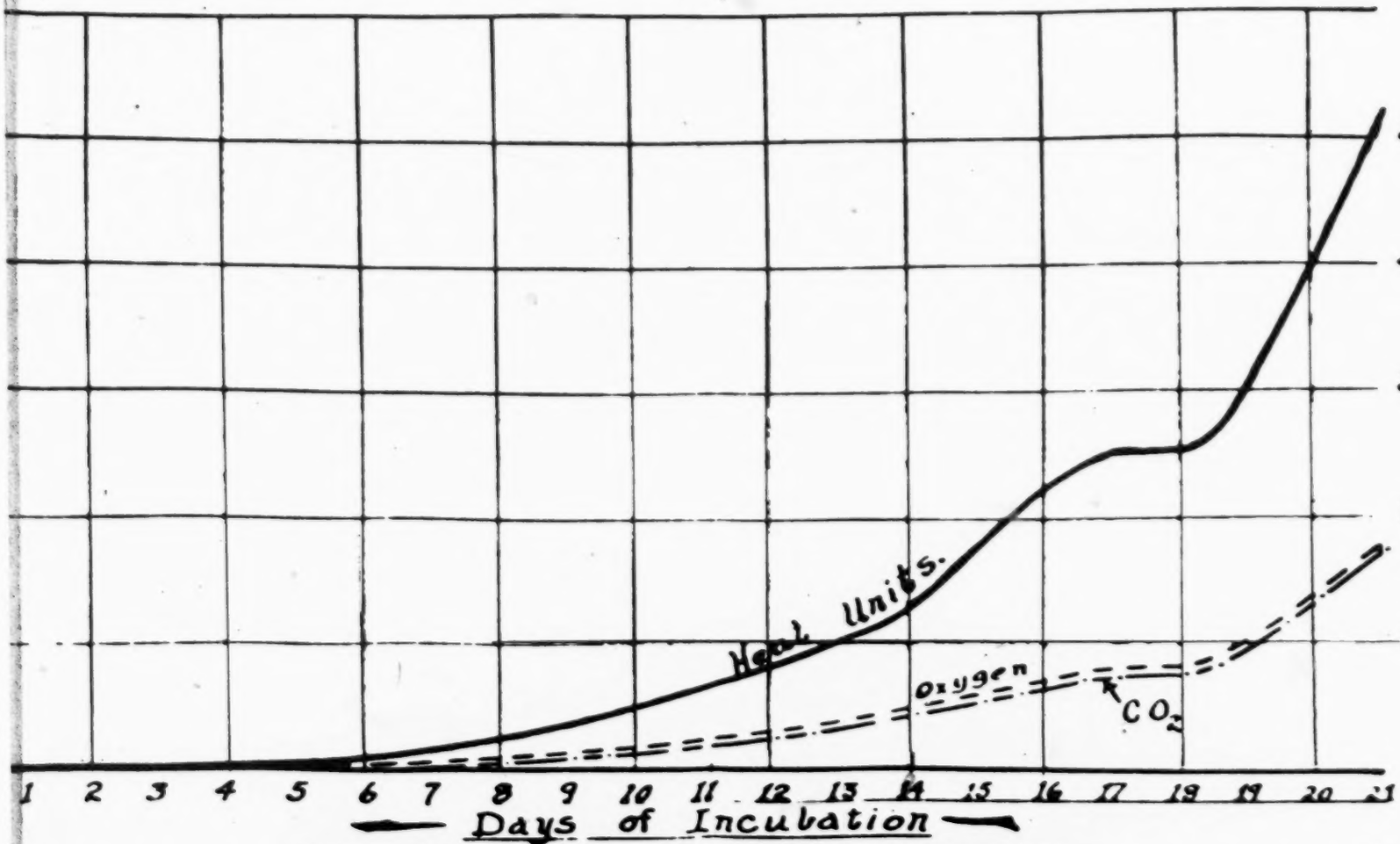
Witnesses:

HANNAH D. PLAIN,

IDA M. SMITH.

Ex 2.

No. 3119 Eib



GRAPH SHOWING DEVELOPMENT OF HEAT UNITS DURING INCUBATION.

J. I. T. 5/22/30.

ove graph shows the heat development within an in- g egg during the 21 days of incubation. The heavy indicates heat units given off per egg per day. shown in calories (.252 calories equal one B.T.U. per dashed curve indicates the amount of oxygen d. The lower dashed-dot curve shows the carbon- given off. The oxygen and carbon-dioxide are in grams per egg per day.

the first four days no heat is given off by the Tests indicate that some heat is absorbed during eriod. From the fourth day heat is given off by , which steadily increases with the exception of h day. On this day the heat given off, and the consumed, hold steadily about as at the close of h day. On the 19th day the increasing develop- heat is resumed in earnest, and doubles between then and the time of hatching. There has been several explanations why the embryo apparently stands still during the 18th day. Probably the best explanation is that during the first 17 days the chick has been living off of the white of the egg while on the 18th day it begins to assimilate the yolk. This changing food diet probably causes readjustment which temporarily checks development.

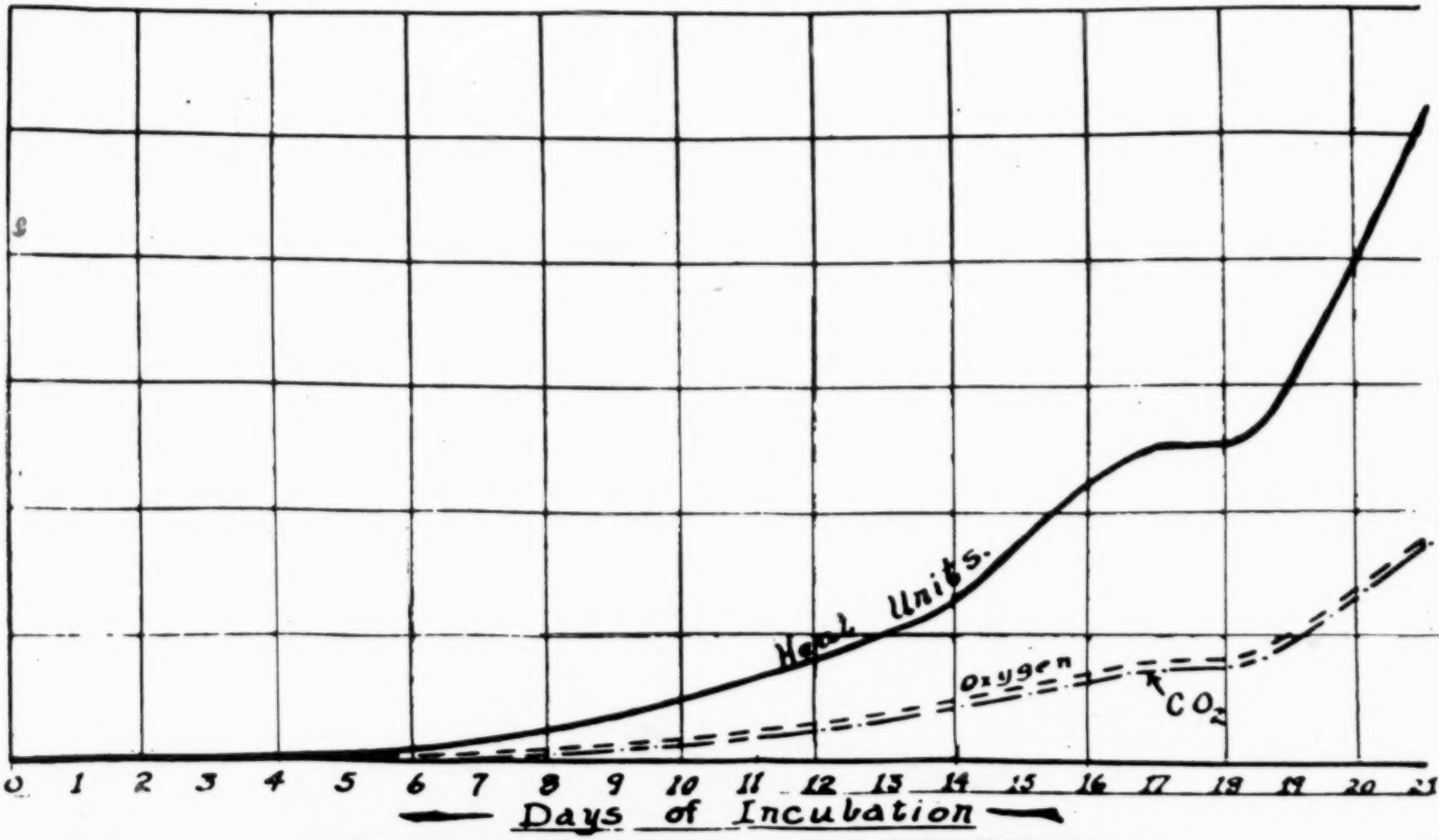
The above graphs are the result of studies with calorimeters. The egg is placed within a calorimeter that is maintained at a constant temperature. Proper allowance is made for all heat radiated, and the heat generated within the egg can be measured. At the same time accurate check is kept on all air that passes in and out of the calorimeter, measuring the oxygen consumed and the carbon-dioxide given off. J. I. T. 5/22/30.

Plaintiff's Exhibit 2

433

Ex 2.

No. 3119 Eib



GRAPH SHOWING DEVELOPMENT OF HEAT UNITS DURING INCUBATION.

The above graph shows the heat development within an incubating egg during the 21 days of incubation. The heavy curve indicates heat units given off per egg per day. This is shown in calories (.252 calories equal one B.T.U. The upper dashed curve indicates the amount of oxygen consumed. The lower dashed-dot curve shows the carbon-dioxide given off. The oxygen and carbon-dioxide are shown in grams per egg per day.

During the first four days no heat is given off by the egg. Tests indicate that some heat is absorbed during this period. From the fourth day heat is given off by the egg, which steadily increases with the exception of the 18th day. On this day the heat given off, and the oxygen consumed, hold steadily about as at the close of the 17th day. On the 19th day the increasing development of heat is resumed in earnest, and doubles between then and the time of hatching. There has been several explanations why the embryo apparently stands still during the 18th day. Probably the best explanation is that during the first 17 days the chick has been living off of the white of the egg while on the 18th day it begins to assimilate the yolk. This changing food diet probably causes readjustment which temporarily checks development.

The above graphs are the result of studies with calorimeters. The egg is placed within a calorimeter that is maintained at a constant temperature. Proper allowance is made for all heat radiated, and the heat generated within the egg can be measured. At the same time accurate check is kept on all air that passes in and out of the calorimeter, measuring the oxygen consumed and the carbon-dioxide given off. J. I. T. 3/22/30.

Plaintiff's Exhibit 3

RECORD OF HEAT DEVELOPMENT IN EGGS OF THE RINGED FOWL

AT VARIOUS STAGES OF INCUBATION.

Number of days eggs had been in incubator when tests were started.	Time eggs had been sealed in box when temperature was taken.										
	30 min.	1 hr.	1:30	2 hrs.	2:30	3 hrs.	3:30	4 hrs.	4:30	5 hrs.	5:30
5 days - 12 hours	98.6°	98.7°	98.8°	98.8°	98.8°	98.8°	98.8°	98.8°	98.8°	98.8°	98.8°
7 days - 12 hours	98.7°	98.7°	98.8°	98.9°	99.°	99.°	99°	99.°	99.°	99.°	99.°
9 days - 16 hours	98.6°	98.6°	98.8°	98.8°	98.9°	98.9°	99.°	99.°	99.°	99°	99.°
12 days - 16 hours	99.2°	99.4°	99.6°	100.°	100.2°	100.5°	100.8°	101.1°	101.4°	101.6°	101.8°
14 days - 16 hours	99.2°	99.4°	99.6°	100.2°	100.8°	101.4°	102.°	102.4°	102.8°	103.°	103.°
16 days - 16 hours	100.8°	101.6°	102.4°	103.°	103.6°	104.2°	104.6°	105.°	106.°	107.°	107.°
18 days - 16 hours	101.4°	102.2°	102.8°	103.2°	104.°	105.2°	105.6°	106.°	106.6°	107.2°	107.2°
19 days - 16 hours (Eggs Pipped)	102.6°	104.2°	105.2°	106.°	106.6°	107.°	107.2°	107.5°	107.8°	108°	108.°
20 days - 16 hours	101.8	102.4°	103.2°	104.2°	105.4°	106.8°	108.°	108.6°	109.6°	109.8°	110°
20 days - 16 hours (Eggs Pipped)	103.°	105.°	106.2°	107.4°	108.6°	109.8°	110.4°	111.°	Top of thermometer.		

Temperature of incubator during tests - 99°

When an egg is placed in an incubator, it soon assumes the temperature of the surrounding air. If the egg is fertile and the environment proper, the germ within the egg will grow and develop into a baby chick. For the egg of the common fowl this process takes approximately twenty-one days. During this development from the minute germ spot to the baby chick, all of the original egg with the exception of the shell and about one-fifth of the water content is utilized as food. This growing organism also takes in the necessary oxygen and gives off a corresponding amount of carbon dioxide. This assimilation of food and oxygen produces heat. That is a natural result in any growing animal.

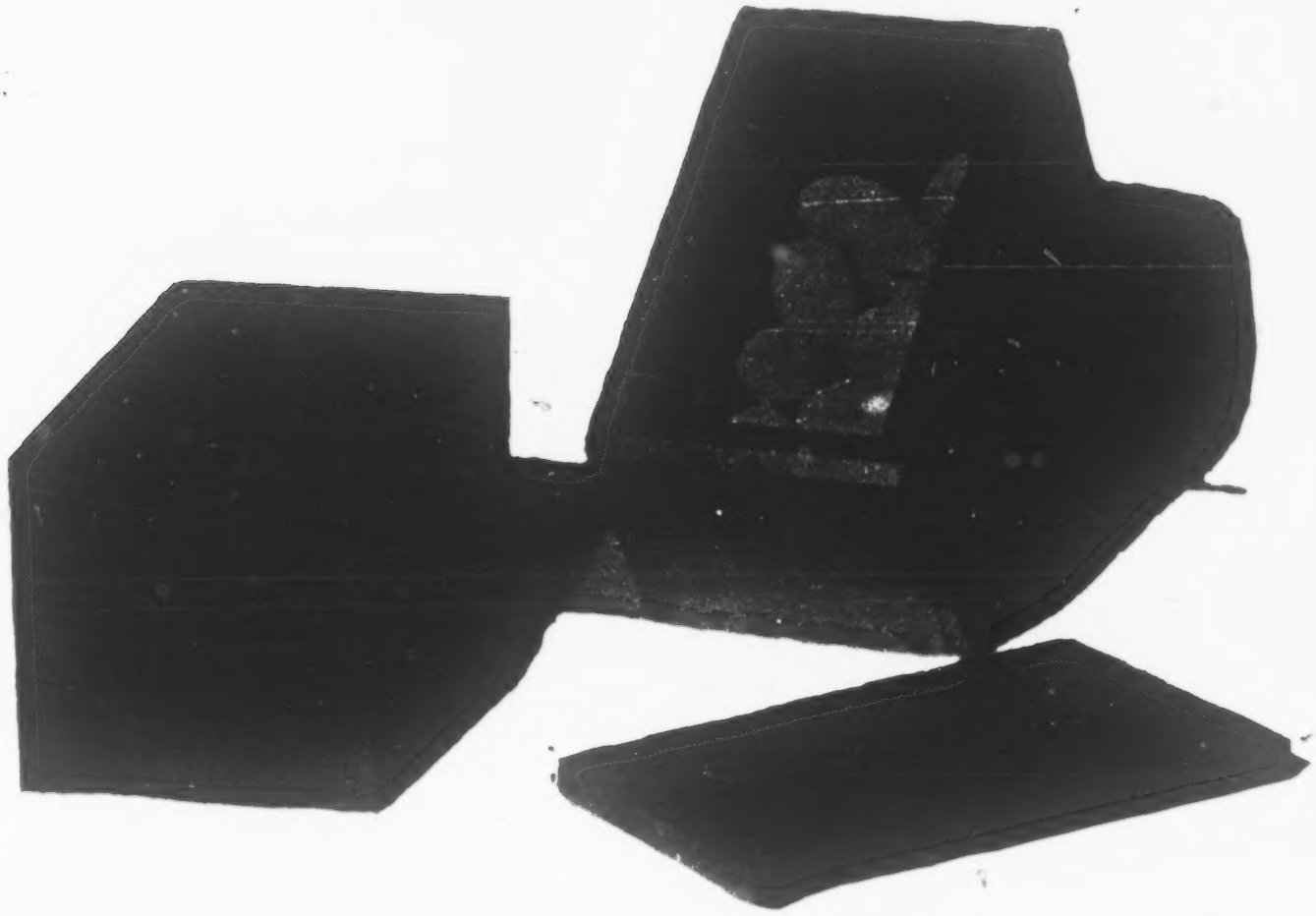
The tests recorded above were made to show this heat development at various stages of incubation. The tests were made in Smith incubators operating in their normal way at 99° Fahrenheit and with a wet bulb temperature of 85°-87°. In each test well insulated boxes, such as shown in the attached photograph, were placed in the incubator for one hour before starting the tests. During this time, the lids were removed so that the interior of the boxes would assume the temperature of the incubator. Twelve fertile eggs of a known stage of incubation were then placed in each box, the lid tightly closed, and the edges sealed with adhesive tape. A tested clinical thermometer was then inserted through the side of the box as shown in the photograph. The bulb was completely within the box, but the temperature of the interior could be read from without. In each case the thermometer was cooled below 90° before inserting it in the box. The sealed box of eggs was then placed on the floor of the incubator and the temperature as shown by the thermometer was recorded at intervals of thirty minutes.

With this arrangement, if the eggs in any box were far enough along in incubation to develop an appreciable amount of heat, the temperature within the box would rise according to the rate of heat development. While this method is not accurate enough to record the heat developed by the eggs during the first ten days, it does show this development nicely for the latter half of the incubating period.

The above record is a summary of tests made at different times during the past two years. Eggs from widely different flocks and breeds of chickens were used.

J.I.P. 11/6/22

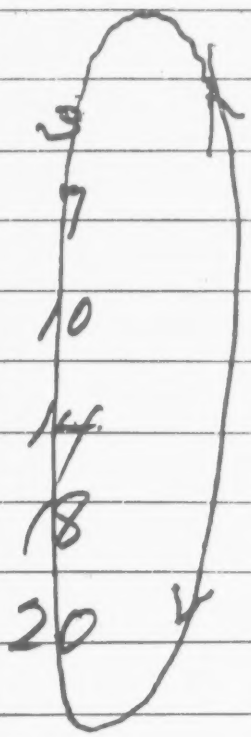
Plaintiff's Exhibit 4

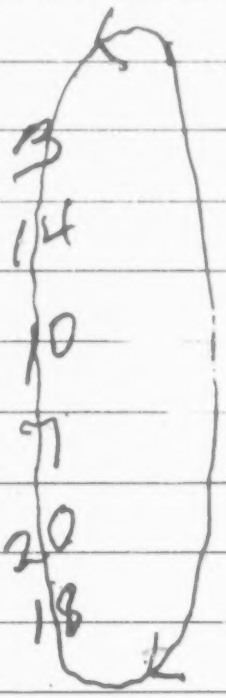


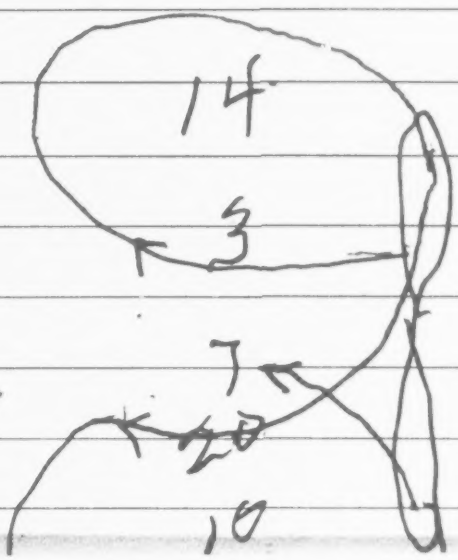
1478

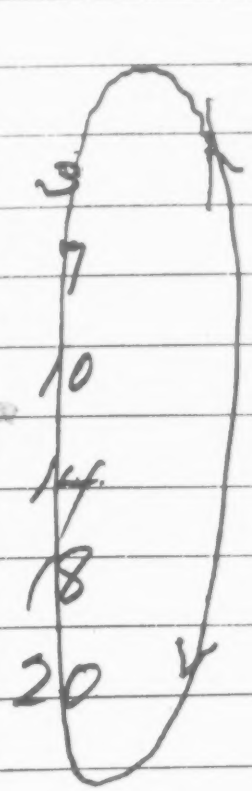
Pltf's Exs
No. 3119 Eq

111





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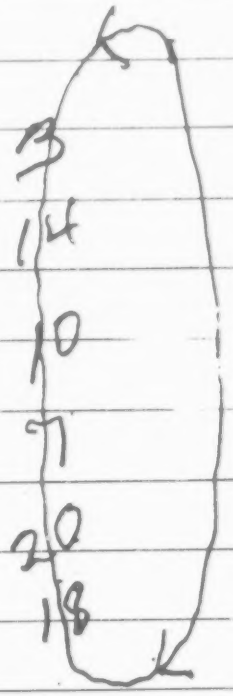
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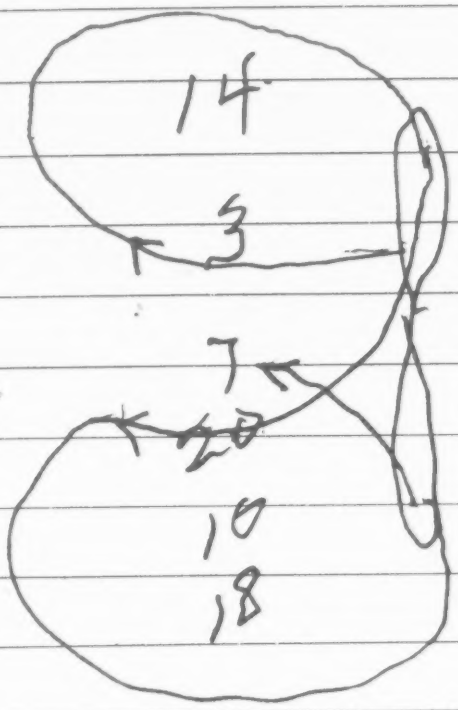
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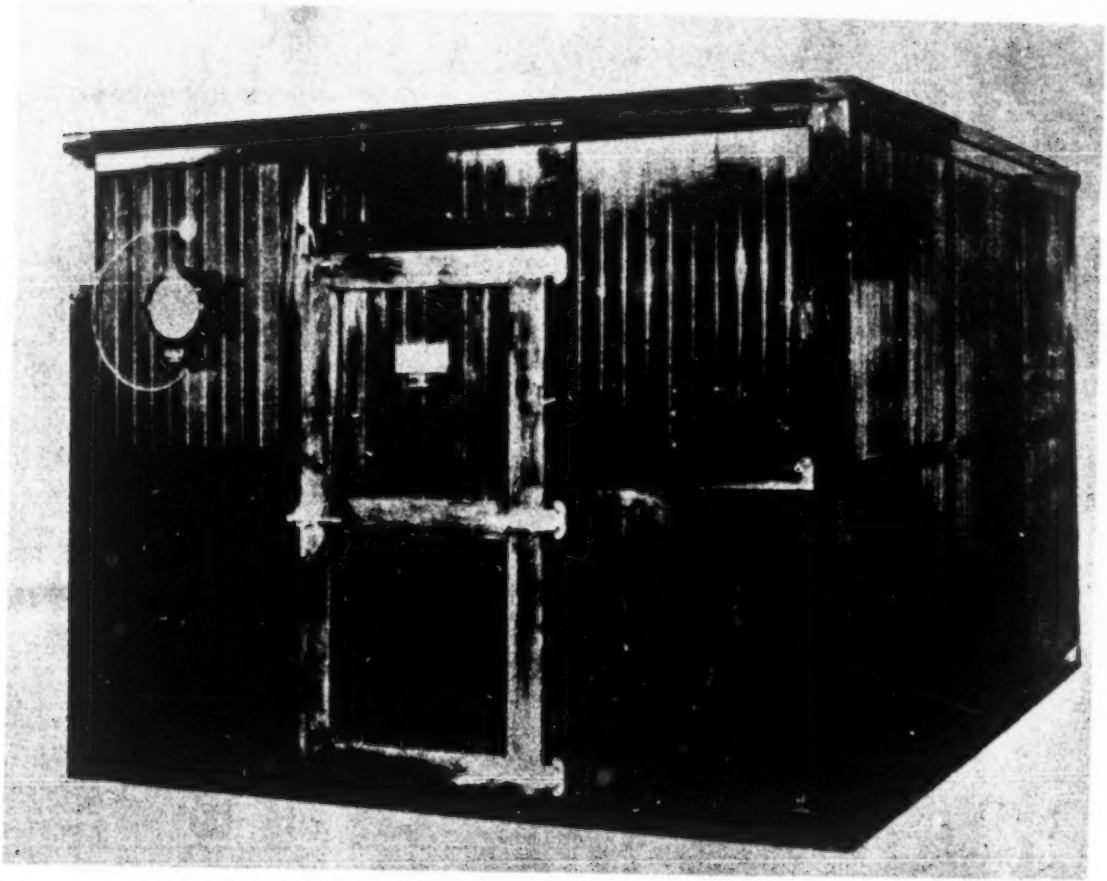
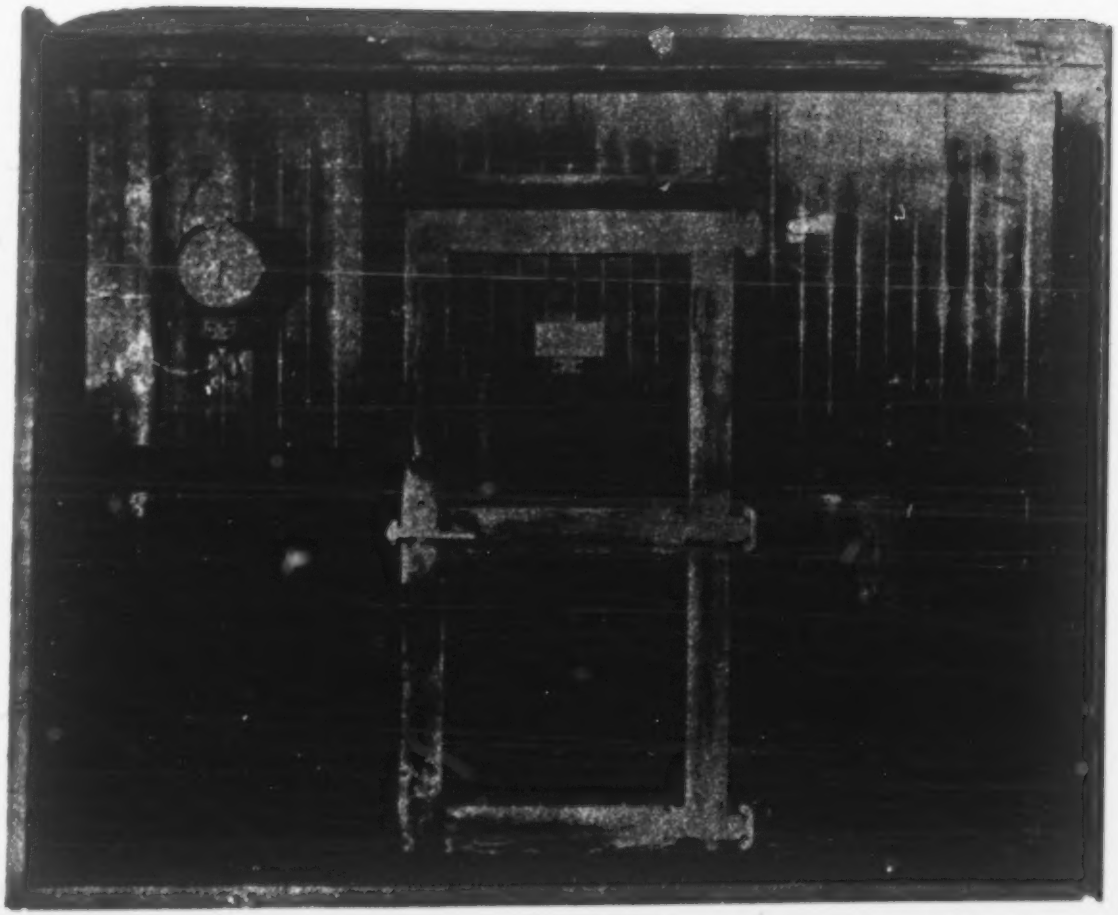
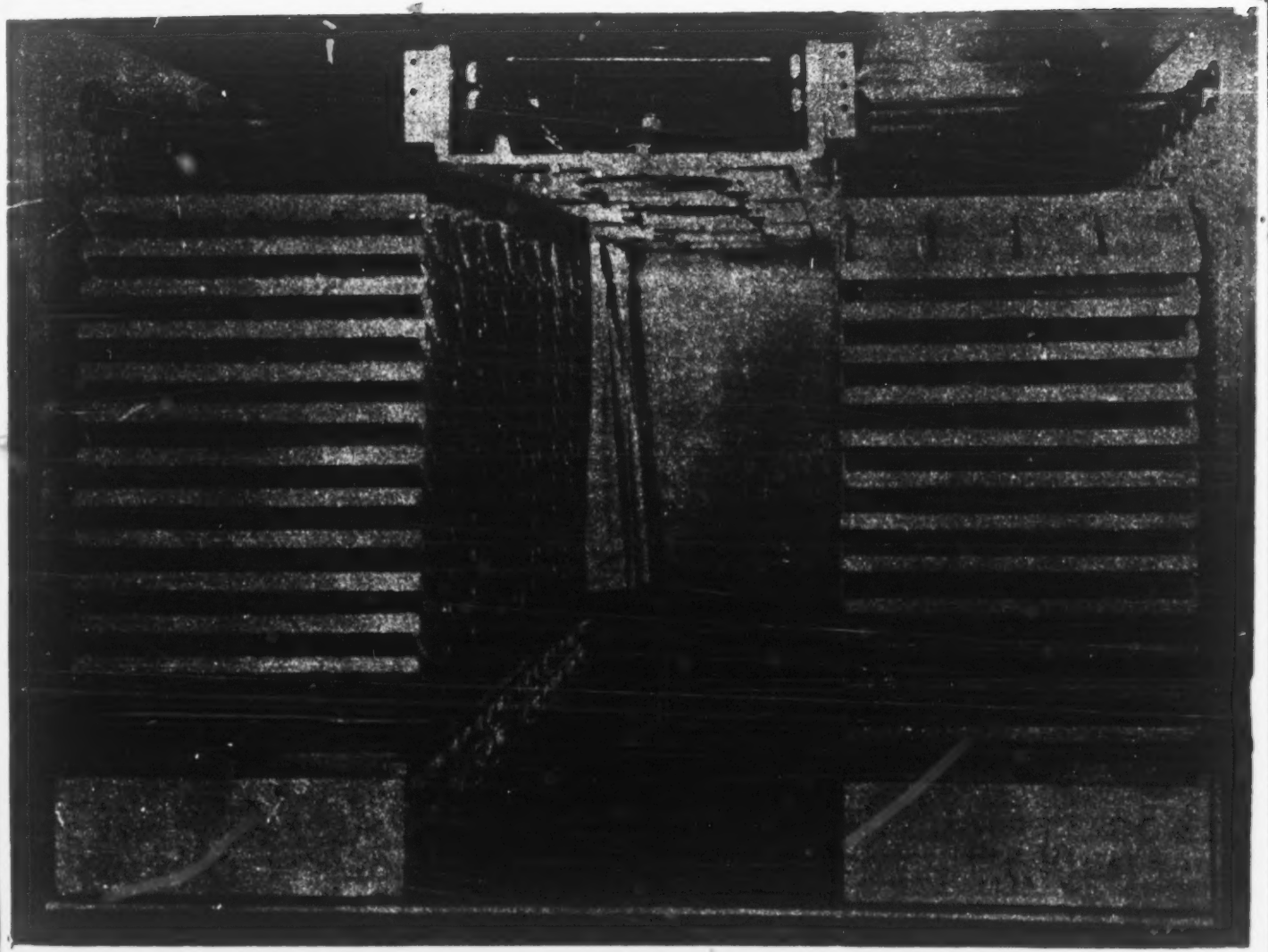
Plaintiff's Exhibit 6



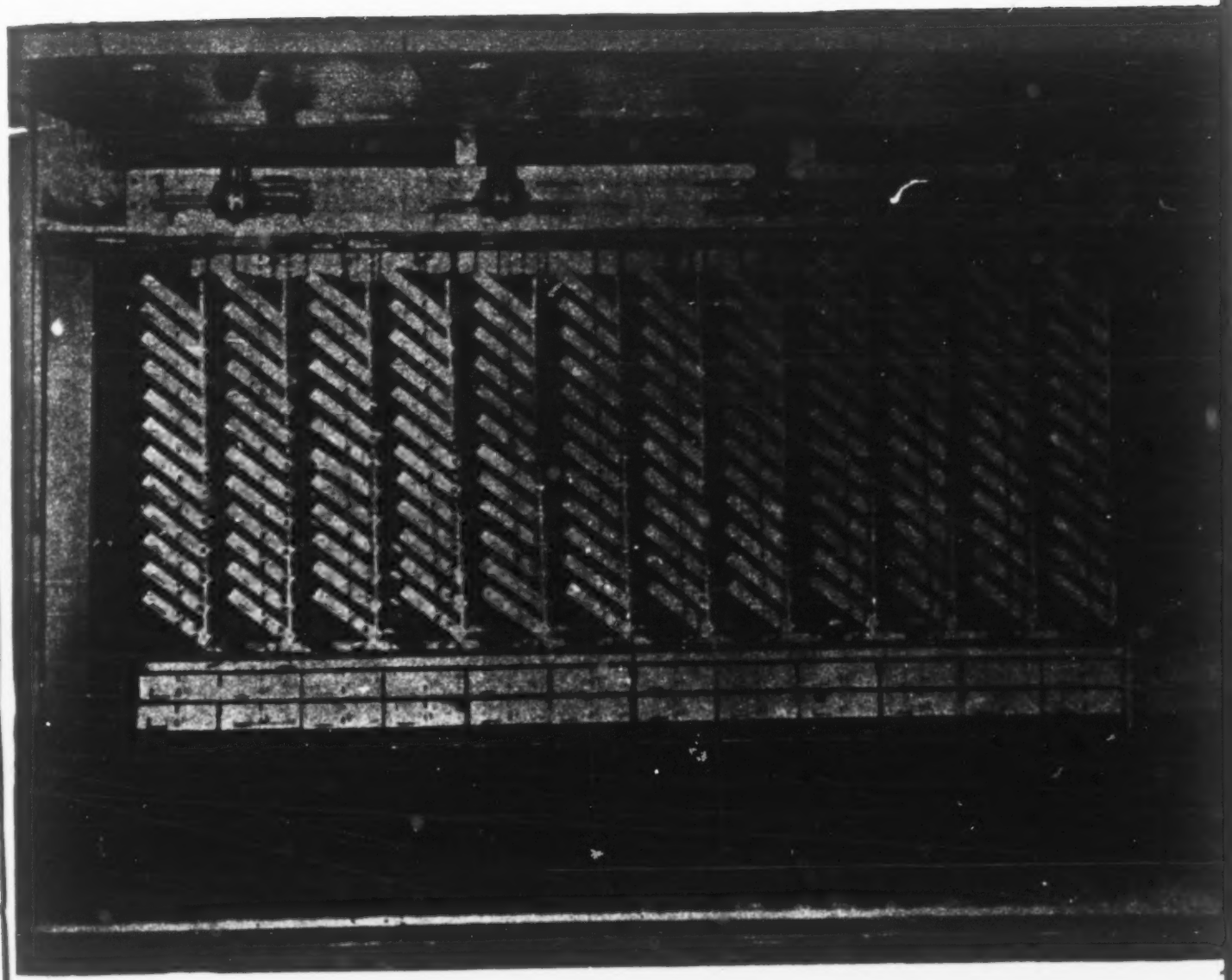
Plaintiff's Exhibit 6A



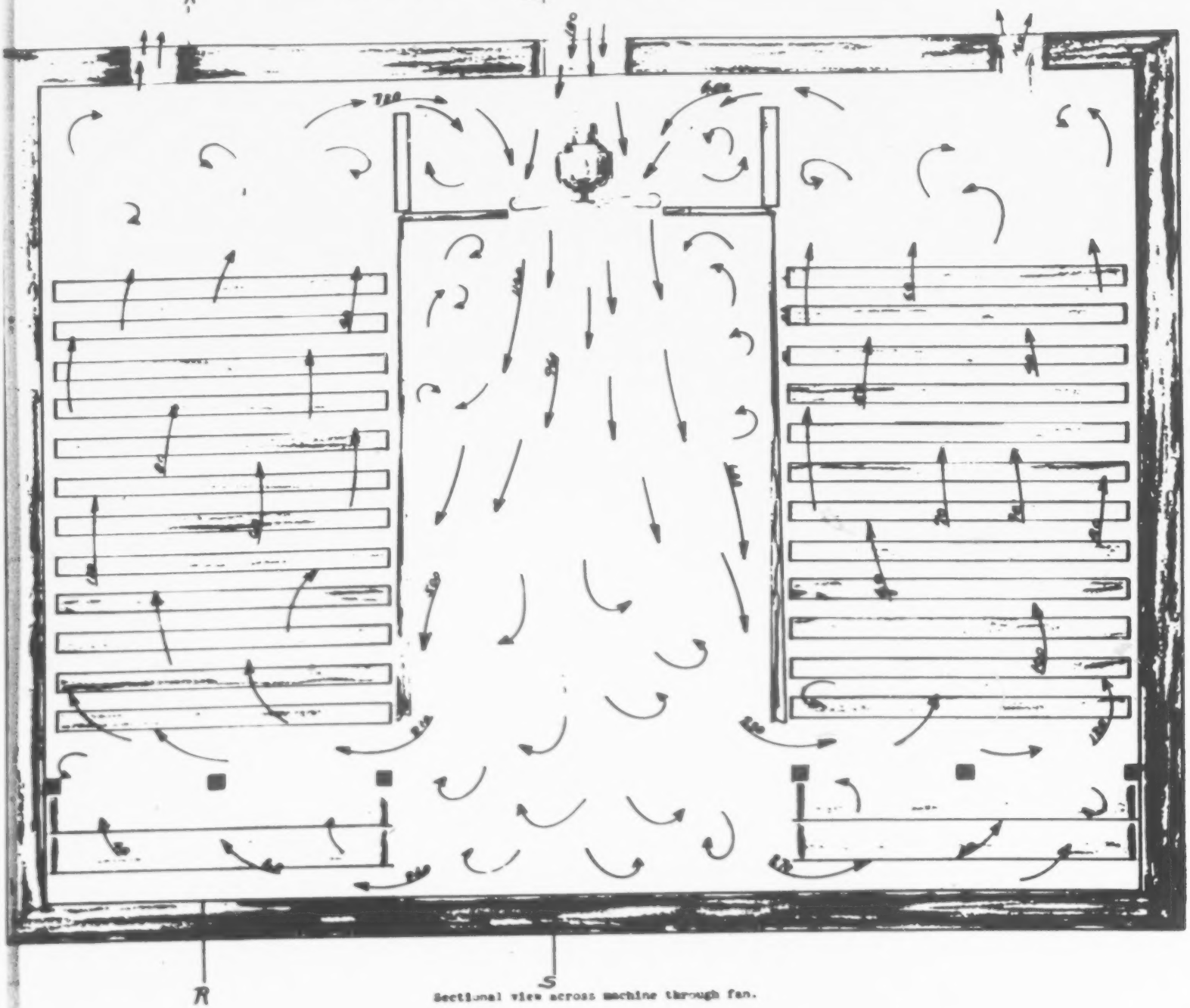
Plaintiff's Exhibit 6B



Plaintiff's Exhibit 6C



SMITH INCUBATOR



R S

Sectional view across machine through fan.

arrows show general direction of air currents. Numbers give approximate speed of currents as recorded by anemometer (Diram).

Readings in lower two trays were taken with anemometers in the trays.

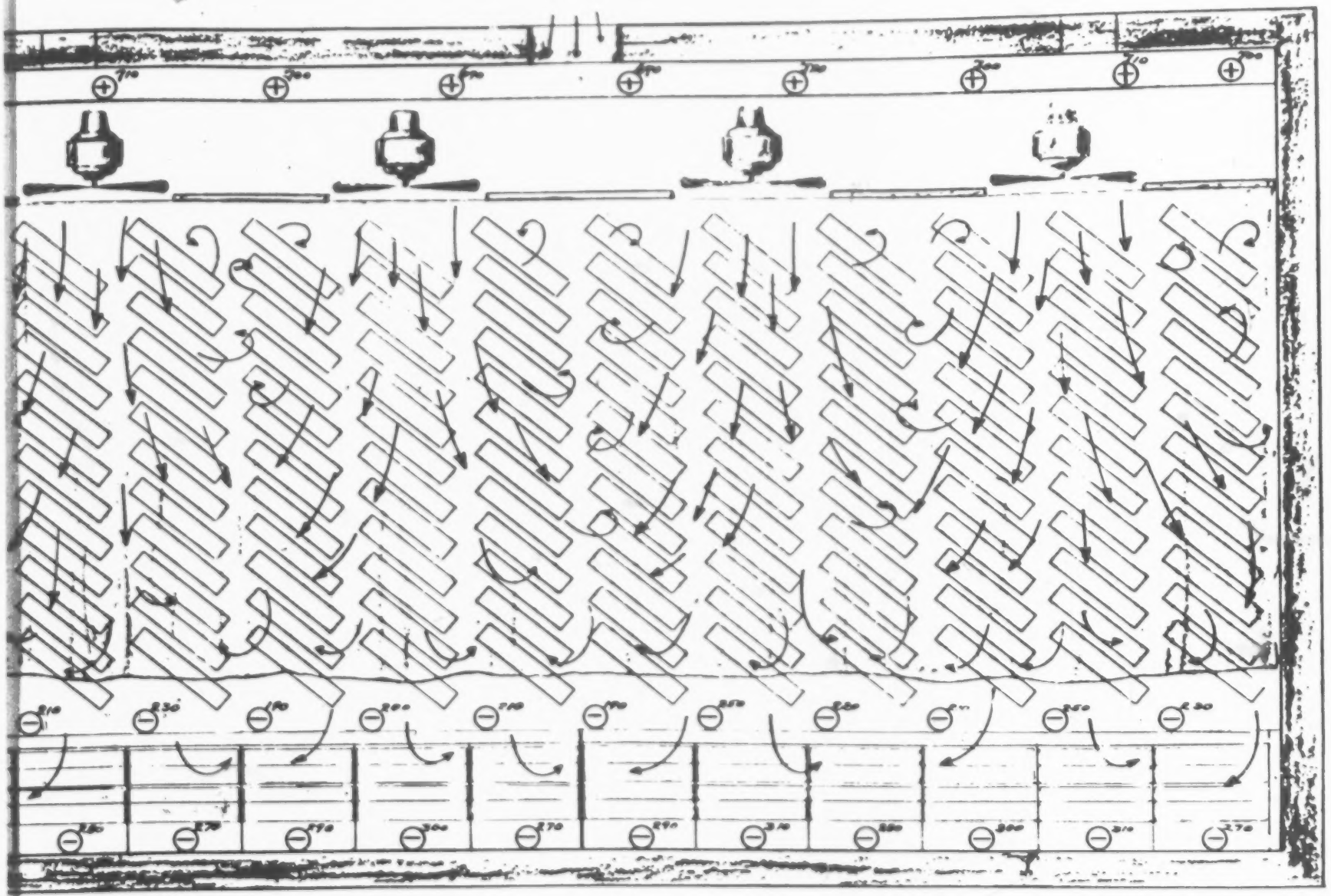
Fans were rotating 1630 to 1650 R. P. M.

Air which passes from corridor under lower two trays goes through the trays to space above. In upper twelve trays a very small per cent of the air which has come from the corridor passes through the tray. The large portion of it goes up the air columns between the trays.

The long arrows sweeping across sides of upper twelve trays show currents between tray columns.

Plaintiff's Exhibit 7

SMITH INCUBATOR



Diagrammatic sectional view along corridor. S S

⊕ — Shows position of anemometer, direction of air flow, and approximate speed of air currents.

⊖ — Air flowing away from fan.

⊕ — Air flowing to the fan.

Anemometer readings shown here were taken with

Shaded portion covering upper twelve trays represents curtain in operating position.

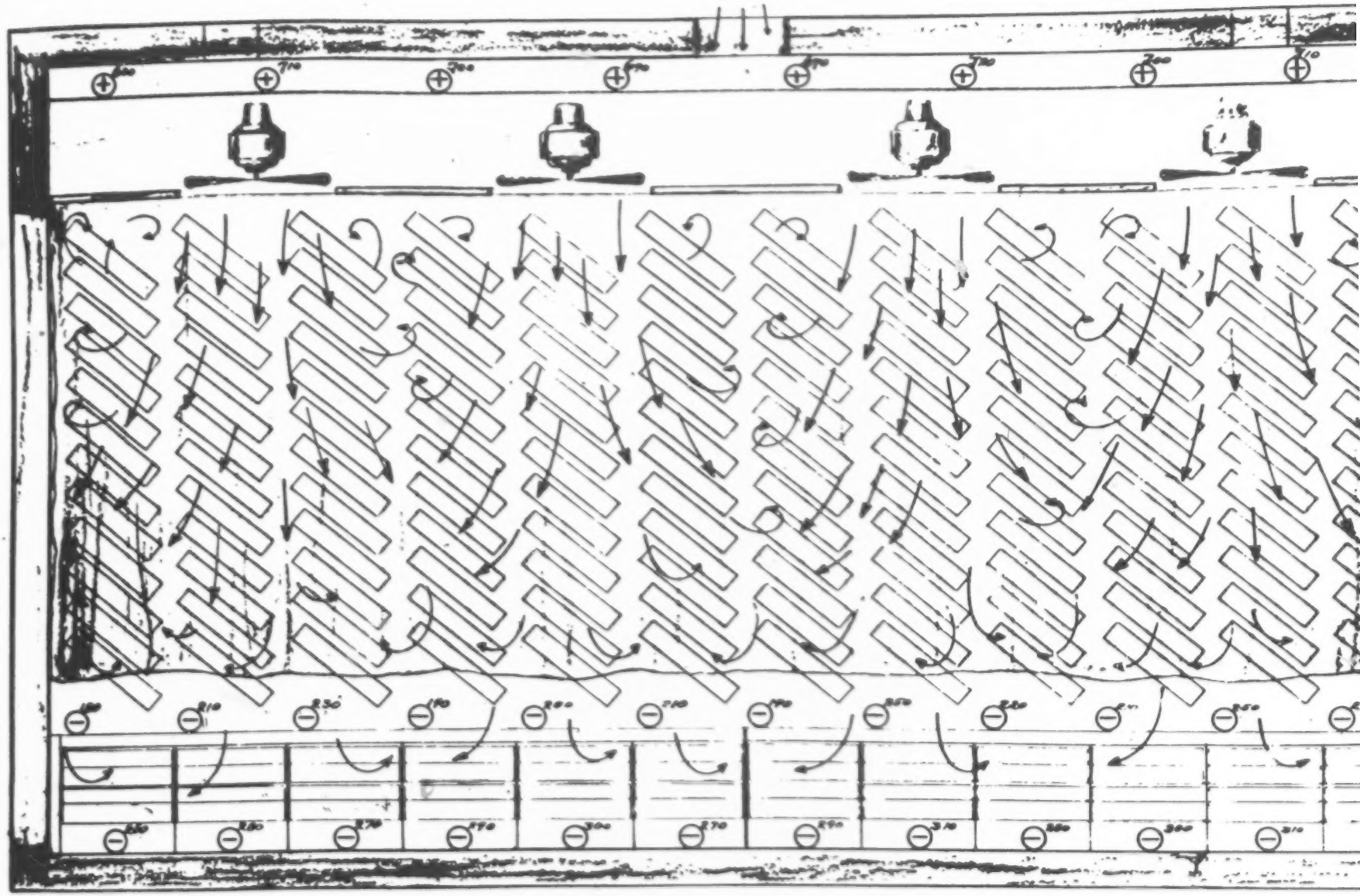
Arrows show general direction of air currents in corridor. Approximate speed of these arrows as recorded by anemometer is given in "Section view across machine through fans".

Fans were rotating [illegible]

Plaintiff's Exhibit 7A

451

SMITH INCUBATOR



Diagrammatic sectional view along corridor. S S

⊕ 100 — Shows position of anemometer, direction of air flow, and approximate speed of air currents.

⊖ — Air flowing away from fan.

⊕ — Air flowing to the fan.

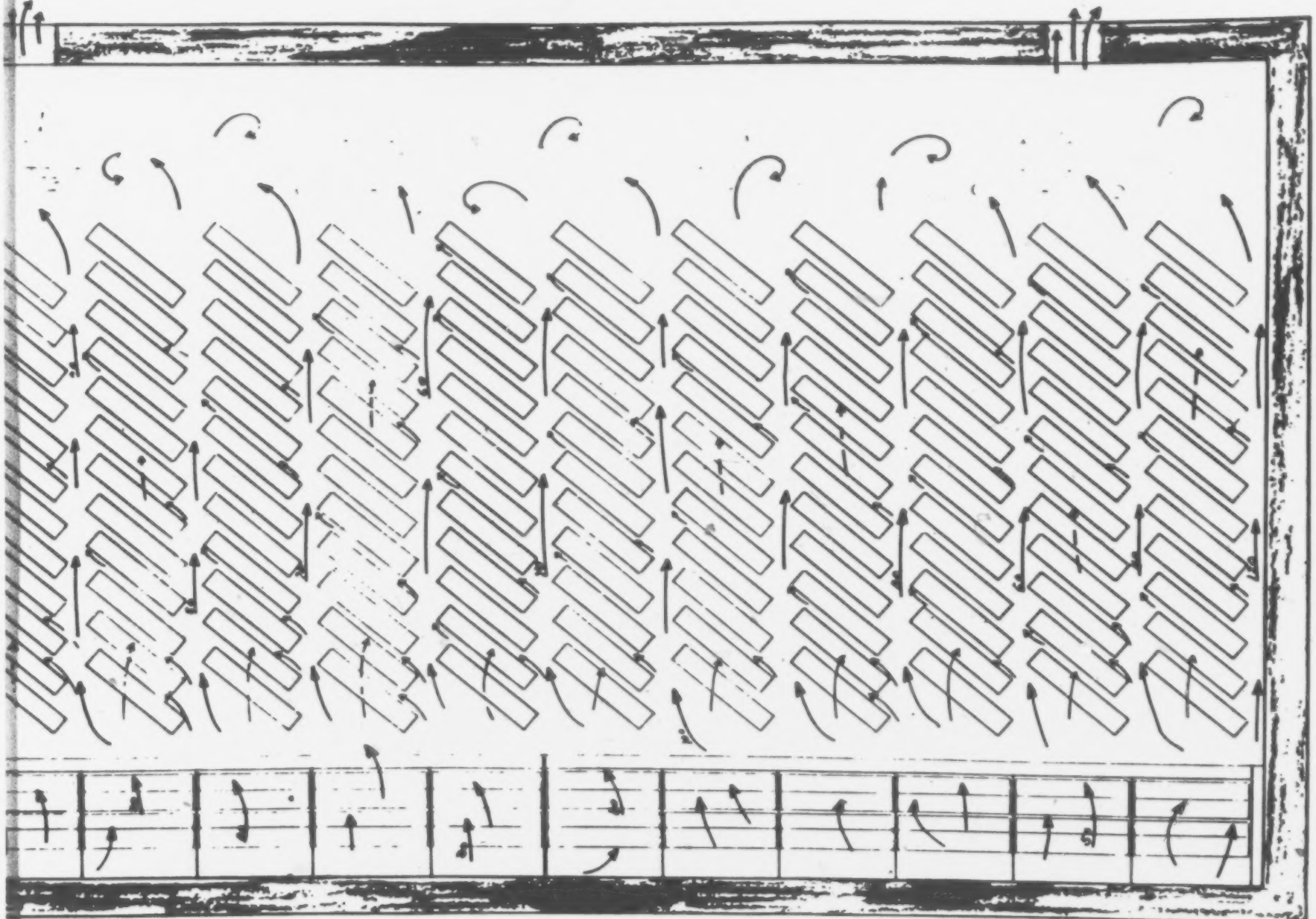
Anemometer readings shown here were taken with anemometer parallel to corridor.

Shaded portion covering upper twelve trays represents curtain in operating position.

Arrows show general direction of air currents in corridor. Approximate speed of these arrows as recorded by anemometer is given in "Section view across machine through fan".

Fans were rotating [illegible] R.P.M.

SMITH INCUBATOR



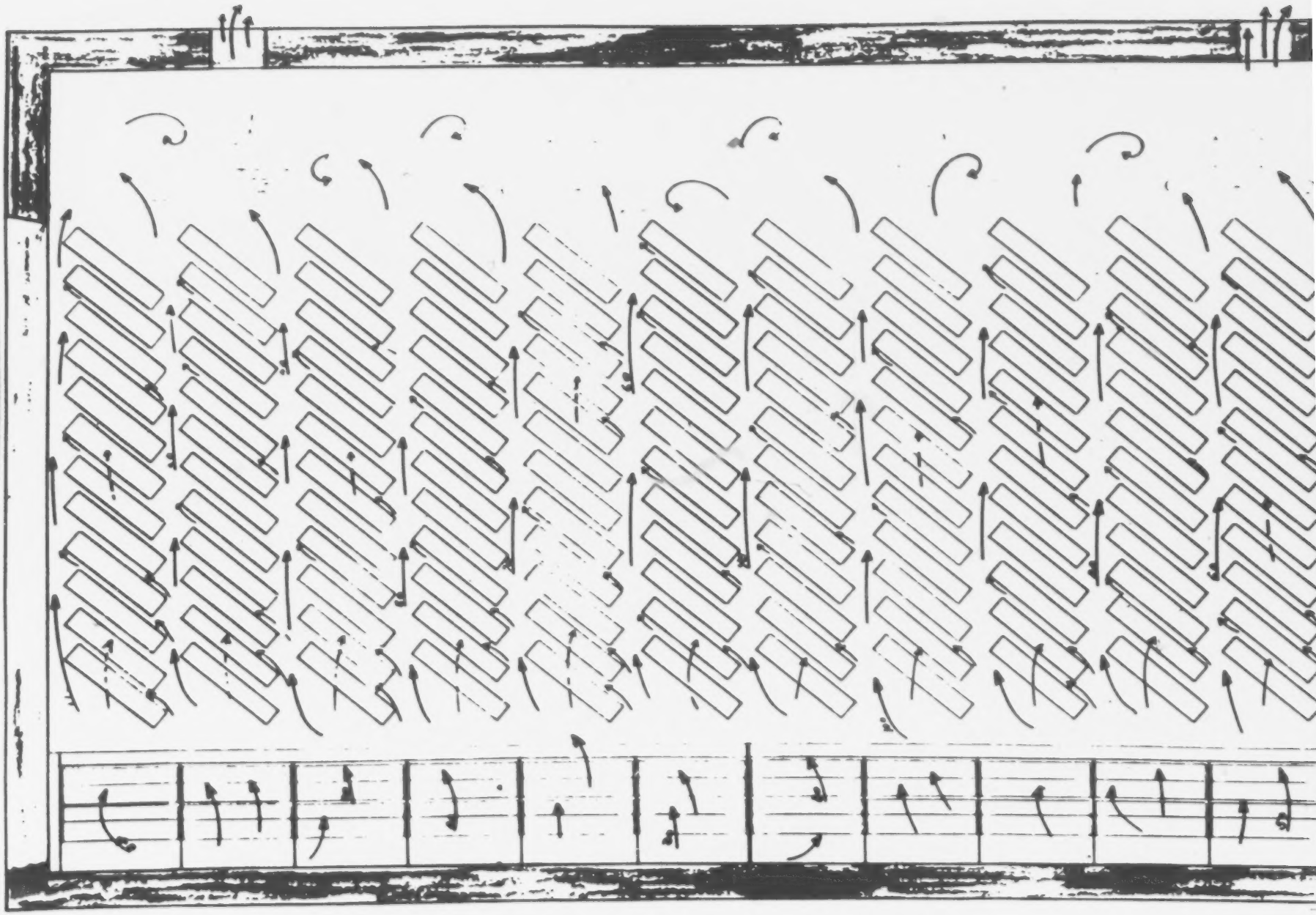
Sectional view in plane parallel to corridor and midway between front and rear of trays. R R

Arrows show general direction of air currents.

Numbers give approximate speed of air currents as recorded by anemometer (Biram). Air which passes from corridor under lower two trays goes through the trays to space above. In upper twelve trays a very small per cent of the air which has come from the corridor passes through the tray. The large portion of it goes up the air columns between the trays.

Plaintiff's Exhibit 7 B

SMITH INCUBATOR



Sectional view in plane parallel to corridor and midway between front and rear of trays. R R

Arrows show general direction of air currents.

Numbers give approximate speed of air currents as recorded by anemometer (Biram). Air which passes from corridor under lower two trays goes through the trays to space above. In upper twelve trays a very small per cent of the air which has come from the corridor passes through the tray. The large portion of it goes up the air columns between the trays.

672 Plaintiff's Exhibits.

8)
8A) Snow Advertisements
8B)

To Be Treated And Dealt With
Under Provisions of C. C. A.
Rule 34.

Plaintiff's Exhibit 9

9

City Leroy State Minn Date July 3, 193

Street ____ County Mower, R. F. D. ____

To Snow's Incubator Company,
Sleepy Eye, Minnesota.

Please enter my (our) order for One Snow's Incubator (45,000) ~~(51,000)~~ egg capacity F. O. B. Leroy

The list price of said incubator is 4000. If this order is signed between the dates of June 15th, 193__, and January 1st, 193__, purchaser will receive off the list price, a discount amounting to ____ per day for each day from the date of signing this order up to January 1st, 193__.

Purchaser will receive a further discount of 200 off the list price, provided full payment shall have been made in cash to Snow's Incubator Company on or before the date said incubator is erected.

In consideration thereof I (we) agree to make the following payments to the order of Snow's Incubator Company at Sleepy Eye, Minnesota, to wit:

Cash payment with order $500.00

One deferred payment, due May 1st, 193 Balance of $3300.00 payable

One deferred payment, due June 1st, 193 when Machine is erected and

One deferred payment, due May 1st, 193 tested to owners approval

One deferred payment, due June 1st, 193 $____

Said deferred payments to be evidenced by notes, said notes to be dated and signed concurrently with this order, and to bear interest at the rate of six per cent per annum from and after October 1st, 193__.

This order is subject to the following conditions and provisions:

1. I (we) agree to transport the above incubator from railroad station to place where same is to be erected at my (our) expense, without delay and I (we) agree to pay all demurrage charges caused by my (our) delay in transporting same after arrival of goods at designated depot.

2. Snow's Incubator Company agrees to erect said incubator without expense to me (us) and to test same by factory expert provided by Snow's Incubator Company for one day free of charge to me (us), said test to be made on or before ____, provided building is ready for occupancy 30 days prior to said date.

3. Snow's Incubator Company is not to be held responsible for any delay in the completion of this contract caused by strikes, fires, floods, unavoidable accidents, war, delays in transportation, or any act of God, or other causes beyond its control, and in such case the time for completion of this contract shall be proportionately extended.

4. Title to the within described property shall remain in the Snow's Incubator Company until the entire purchase price thereof and any note or notes including renewals given therefor, or any judgment for the whole or any part thereof has been paid in full, no matter by what manner or whatever degree said property may be attached to the realty, and I (we) hereby agree not to remove the said property from the place of original delivery so long as any part of the purchase price remains unpaid without first securing the written consent of the Snow's Incubator Company.

5. I (we) further agree to assume the risk of loss and damage to said property and in case of any damage to said property by fire, water or any other cause, I (we) agree to pay to said Snow's Incubator Company the amount of such damage, and in case of destruction thereof from any cause, to pay the above valuation, less any proportion of the purchase price which may have been paid, and I (we) agree to have said property fully insured in standard insurance companies at my (our) own expense, with loss payable to said Snow's Incubator Company as its interest may appear, and if I (we) fail to have said property insured, then the Snow's Incubator Company may have the same fully insured and charge the premium to me (us), which shall be added to the purchase price of said property.

6. In case of my (our) failure to make any payment in time or in the manner as herein provided, the entire unpaid balance of purchase price shall become immediately due and payable, and the Snow's Incubator Company, or its agents, may without legal process, re-take said property and operate same on the premises for the remainder of the hatching season for its own profit; and in any such event I (we) hereby agree to allow you free and unhindered access on the premises or in the building where said property is situated, or to make delivery of said property to you immediately upon request.

7. In the event of the Snow's Incubator Company retaking said property as above provided, any amount that may have been paid thereon shall be considered as payment for use, ordinary wear and depreciation of said property while in my (our) possession, and shall be retained by Snow's Incubator Company. If the amount so paid does not cover the reasonable rental value of said property, then I (we) hereby agree to pay you on demand the balance of such reasonable rental. Nothing in this order shall be construed as obligating the Snow's Incubator Company to accept return of property tendered in lieu of purchase price agreed to be paid.

8. All statutory provisions as to retaking and resale of the property within described are hereby expressly waived. If a claim hereunder is placed in attorney's hands for collection, ten per cent (10%) shall be added thereto and paid as attorney's fees.

9. Said Incubator is guaranteed by Snow's Incubator Company to be of good workmanship and material and any defective part will be replaced any time within one year from date of erection.

10. This order covers all agreements between the Snow's Incubator Company and me (us), either expressed or implied; and when approved by said company at its executive office becomes a contract between the parties as purchaser and seller, respectively. It is expressly agreed that the original hereof has been unconditionally released and delivered for transmission to the Snow's Incubator Company, and that any notice or communication relating hereto or contemplated, hereby shall be made in writing to said Company at Sleepy Eye, Minnesota, and not otherwise.

Witness: Ronald A Bloodhart (Signed) Ralph Kuljeknus

By ____

This order is subject to Approval of the Snow's Incubator Company at Sleepy Eye, Minnesota.

Approved at Sleepy Eye, Minnesota. SNOW'S INCUBATOR COMPANY.

Street _____ County Mower, R. F. D. _____

To Snow's Incubator Company,
Sleepy Eye, Minnesota.

Please enter my (our) order for One Snow's Incubator (45,000) ~~(51,000)~~ egg capacity F. O. B. Leroy

The list price of said incubator is 4000. If this order is signed between the dates of June 15th, 193___, and January 1st, 193___, purchaser will receive off the list price, a discount amounting to _____ per day for each day from the date of signing this order up to January 1st, 193___.

Purchaser will receive a further discount of 200.00 off the list price, provided full payment shall have been made in cash to Snow's Incubator Company on or before the date said incubator is erected.

In consideration thereof I (we) agree to make the following payments to the order of Snow's Incubator Company at Sleepy Eye, Minnesota, to wit:

Cash payment with order $500.00 Balance of $3300.00 payable

One deferred payment, due May 1st, 193___ when Machine is erected and

One deferred payment, due June 1st, 193___ tested to owners approval

One deferred payment, due May 1st, 193___ $_____

One deferred payment, due June 1st, 193___ $_____

Said deferred payments to be evidenced by notes, said notes to be dated and signed concurrently with this order, and to bear interest at the rate of six per cent per annum from and after October 1st, 193___.

This order is subject to the following conditions and provisions:

1. I (we) agree to transport the above incubator from railroad station to place where same is to be erected at my (our) expense, without delay and I (we) agree to pay all demurrage charges caused by my (our) delay in transporting same after arrival of goods at designated depot.

2. Snow's Incubator Company agrees to erect said incubator without expense to me (us) and to test same by factory expert provided by Snow's Incubator Company for one day free of charge to me (us), said test to be made on or before....., provided building is ready for occupancy 30 days prior to said date.

3. Snow's Incubator Company is not to be held responsible for any delay in the completion of this contract caused by strikes, fires, floods, unavoidable accidents, war, delays in transportation, or any act of God, or other causes beyond its control, and in such case the time for completion of this contract shall be proportionately extended.

4. Title to the within described property shall remain in the Snow's Incubator Company until the entire purchase price thereof and any note or notes including renewals given therefor, or any judgment for the whole or any part thereof has been paid in full, no matter by what manner or whatever degree said property may be attached to the realty, and I (we) hereby agree not to remove the said property from the place of original delivery so long as any part of the purchase price remains unpaid without first securing the written consent of the Snow's Incubator Company.

5. I (we) further agree to assume the risk of loss and damage to said property and in case of any damage to said property by fire, water or any other cause, I (we) agree to pay to said Snow's Incubator Company the amount of such damage, and in case of destruction thereof from any cause, to pay the above valuation, less any proportion of the purchase price which may have been paid, and I (we) agree to have said property fully insured in standard insurance companies at my (our) own expense, with loss payable to said Snow's Incubator Company as its interest may appear, and if I (we) fail to have said property insured, then the Snow's Incubator Company may have the same fully insured and charge the premium to me (us), which shall be added to the purchase price of said property.

6. In case of my (our) failure to make any payment in time or in the manner as herein provided, the entire unpaid balance of purchase price shall become immediately due and payable, and the Snow's Incubator Company, or its agents, may without legal process, re-take said property and operate same on the premises for the remainder of the hatching season for its own profit; and in any such event I (we) hereby agree to allow you free and unhindered access on the premises or in the building where said property is situated, or to make delivery of said property to you immediately upon request.

7. In the event of the Snow's Incubator Company retaking said property as above provided, any amount that may have been paid thereon shall be considered as payment for use, ordinary wear and depreciation of said property while in my (our) possession, and shall be retained by Snow's Incubator Company. If the amount so paid does not cover the reasonable rental value of said property, then I (we) hereby agree to pay you on demand the balance of such reasonable rental. Nothing in this order shall be construed as obligating the Snow's Incubator Company to accept return of property tendered in lieu of purchase price agreed to be paid.

8. All statutory provisions as to retaking and resale of the property within described are hereby expressly waived. If a claim hereunder is placed in attorney's hands for collection, ten per cent (10%) shall be added thereto and paid as attorney's fees.

9. Said Incubator is guaranteed by Snow's Incubator Company to be of good workmanship and material and any defective part will be replaced any time within one year from date of erection.

10. This order covers all agreements between the Snow's Incubator Company and me (us), either expressed or implied; and when approved by said company at its executive office becomes a contract between the parties as purchaser and seller, respectively. It is expressly agreed that the original hereof has been unconditionally released and delivered for transmission to the Snow's Incubator Company, and that any notice or communication relating hereto or contemplated, hereby shall be made in writing to said Company at Sleepy Eye, Minnesota, and not otherwise.

Witness: Harold W. Hotka

(Signed) Ralph Hopkins

By _____

This order is subject to Approval of the Snow's Incubator Company at Sleepy Eye, Minnesota.
Approved at Sleepy Eye, Minnesota.

SNOW'S INCUBATOR COMPANY.

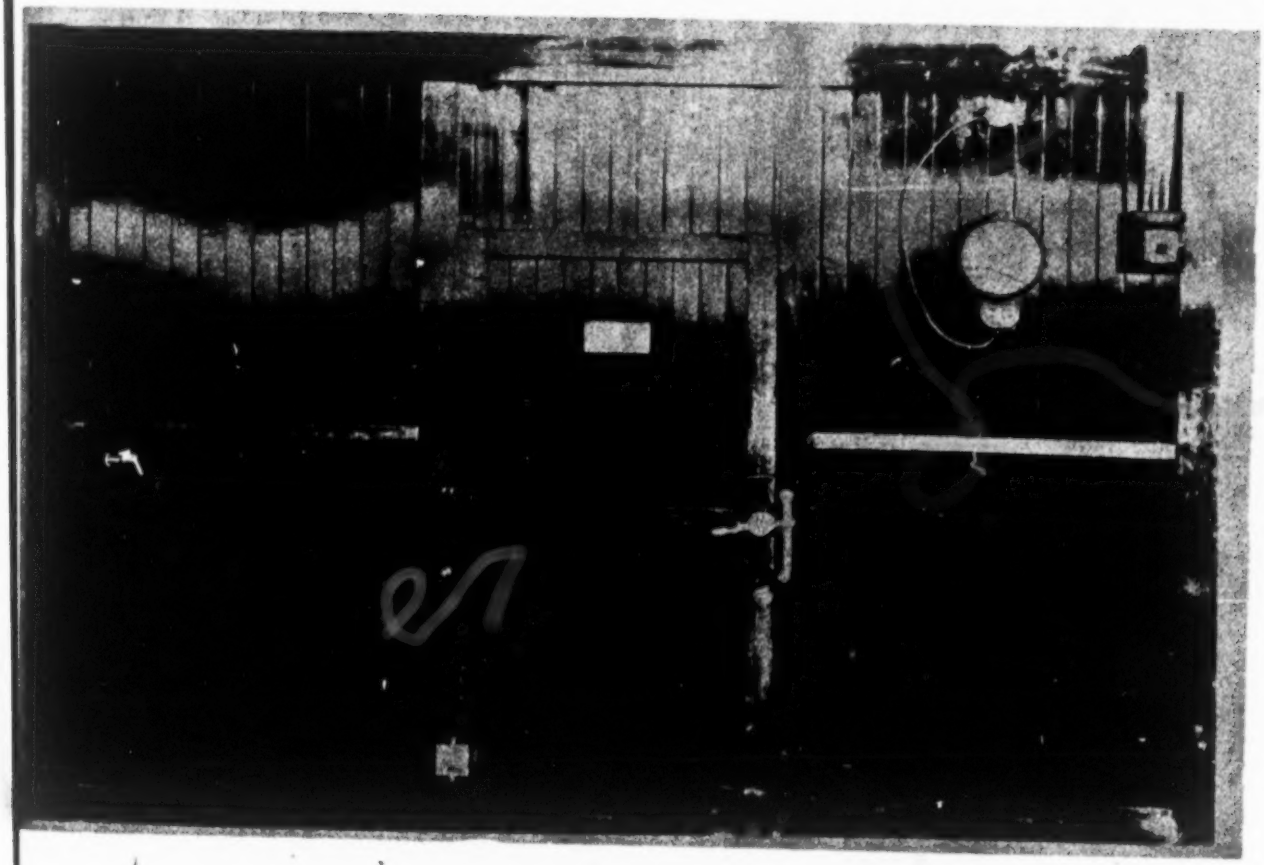
This ___ day of _____, 19___

By E. H. Snow

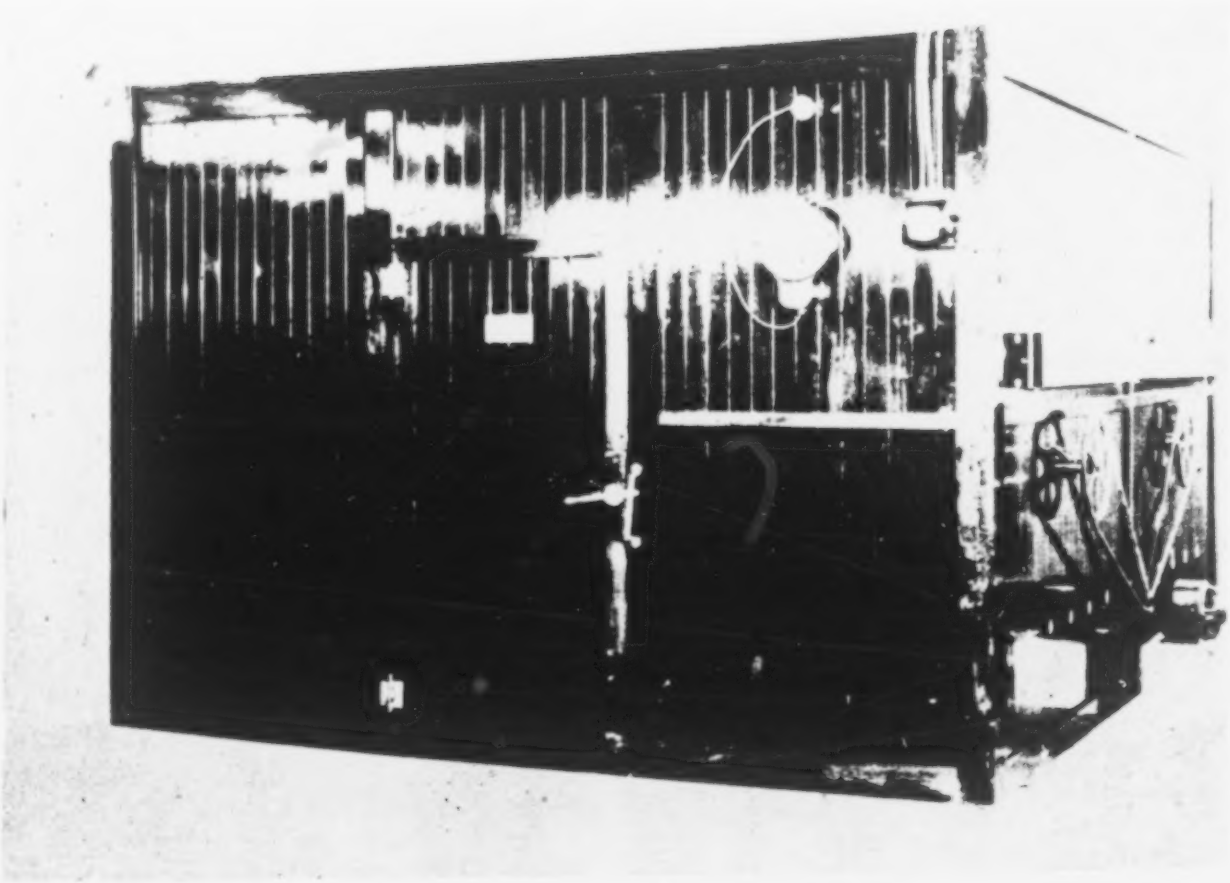
Date received at home office of Snow's Incubator Co. _____

Delivery to be made Between
July 6 - 8 - 1931

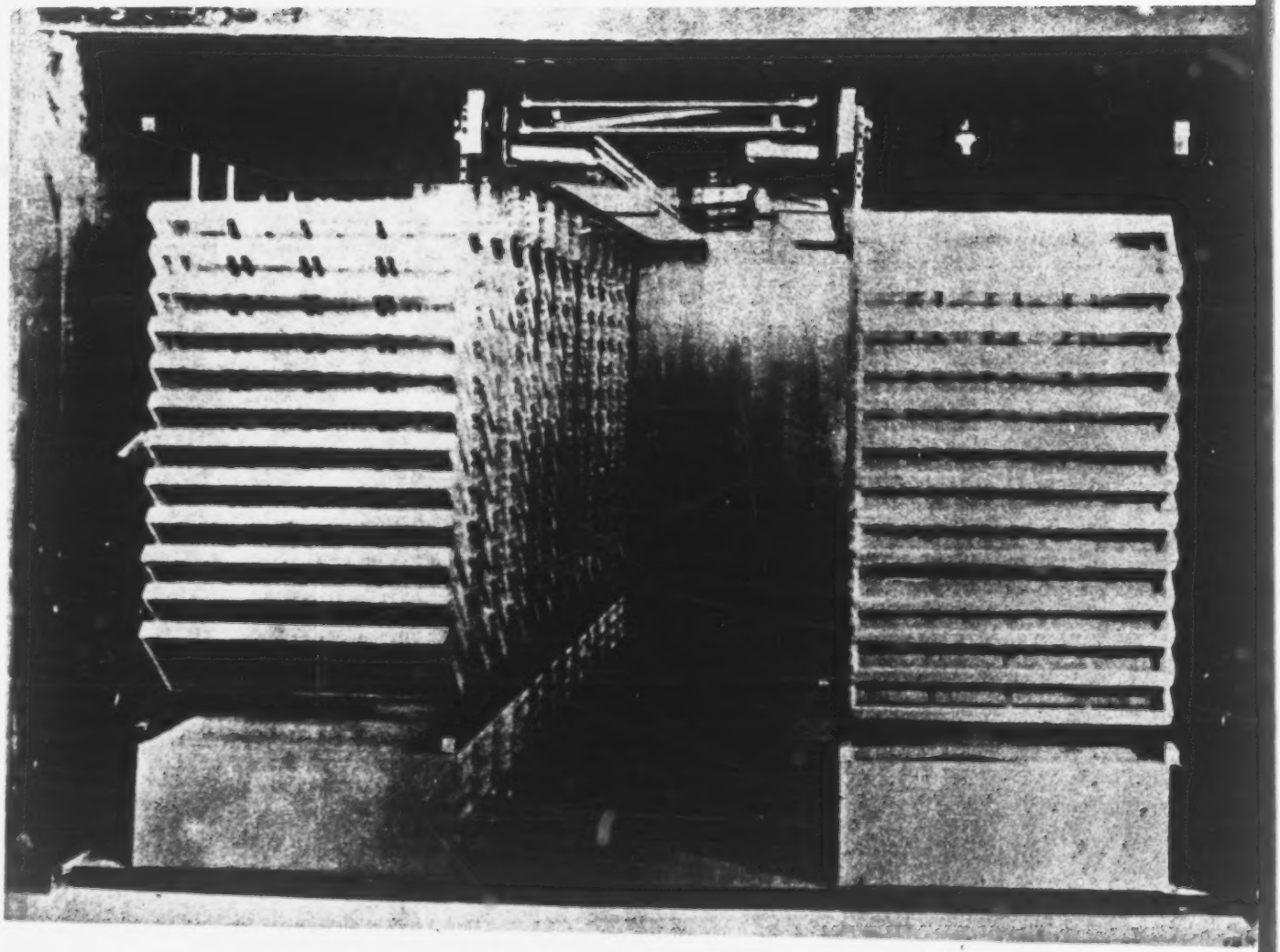
Plaintiff's Exhibit 10



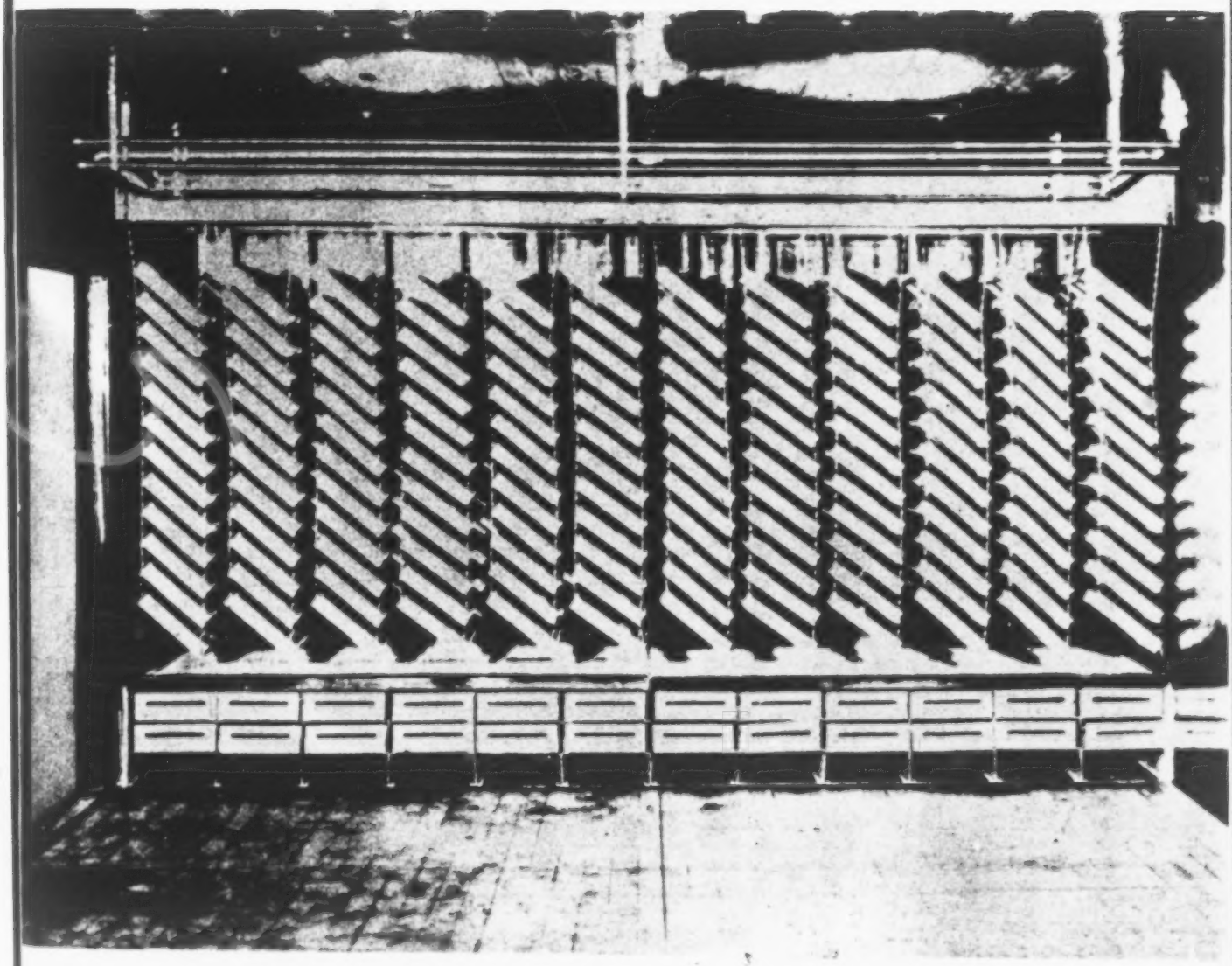
Plaintiff's Exhibit 10A



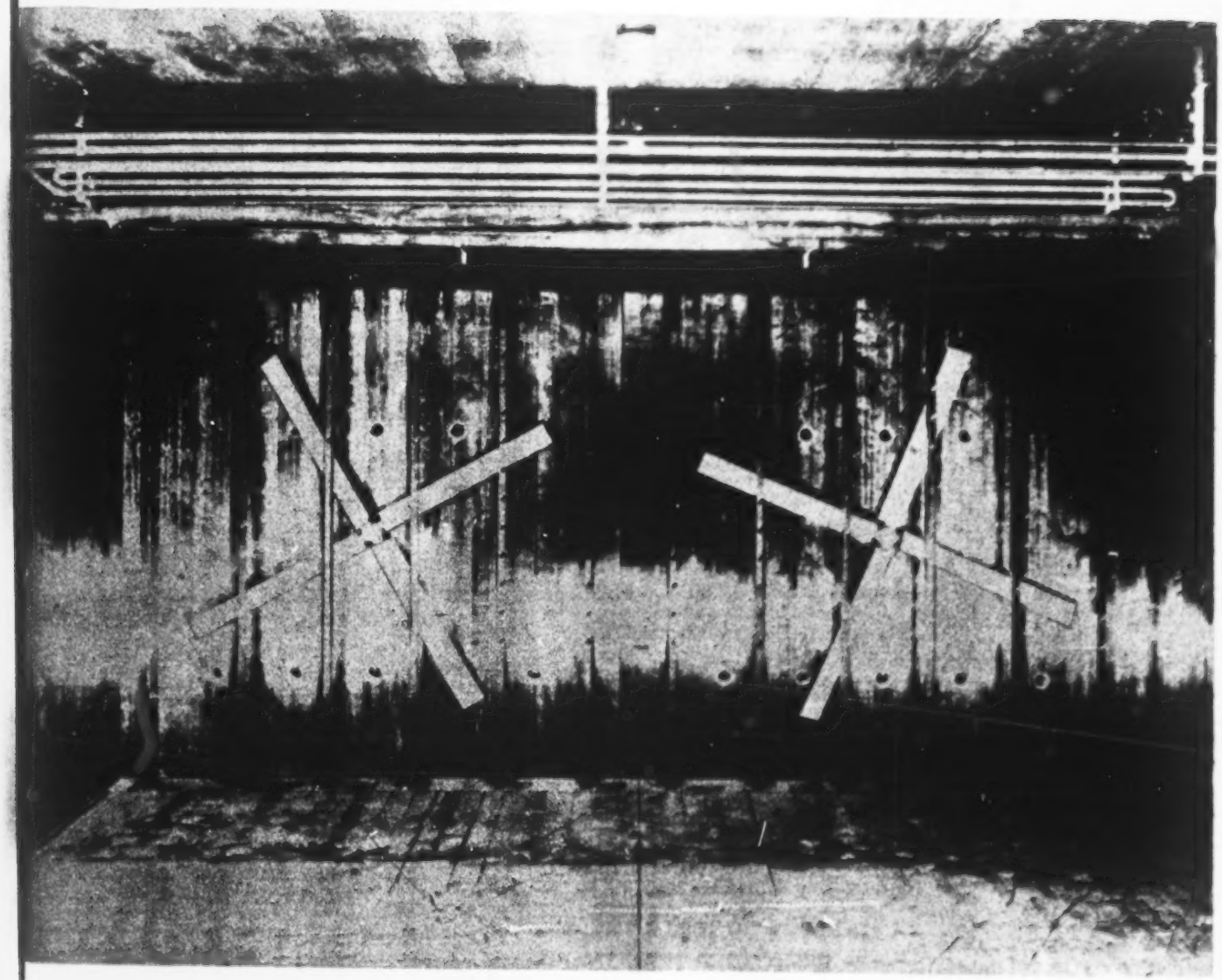
Plaintiff's Exhibit 10 B



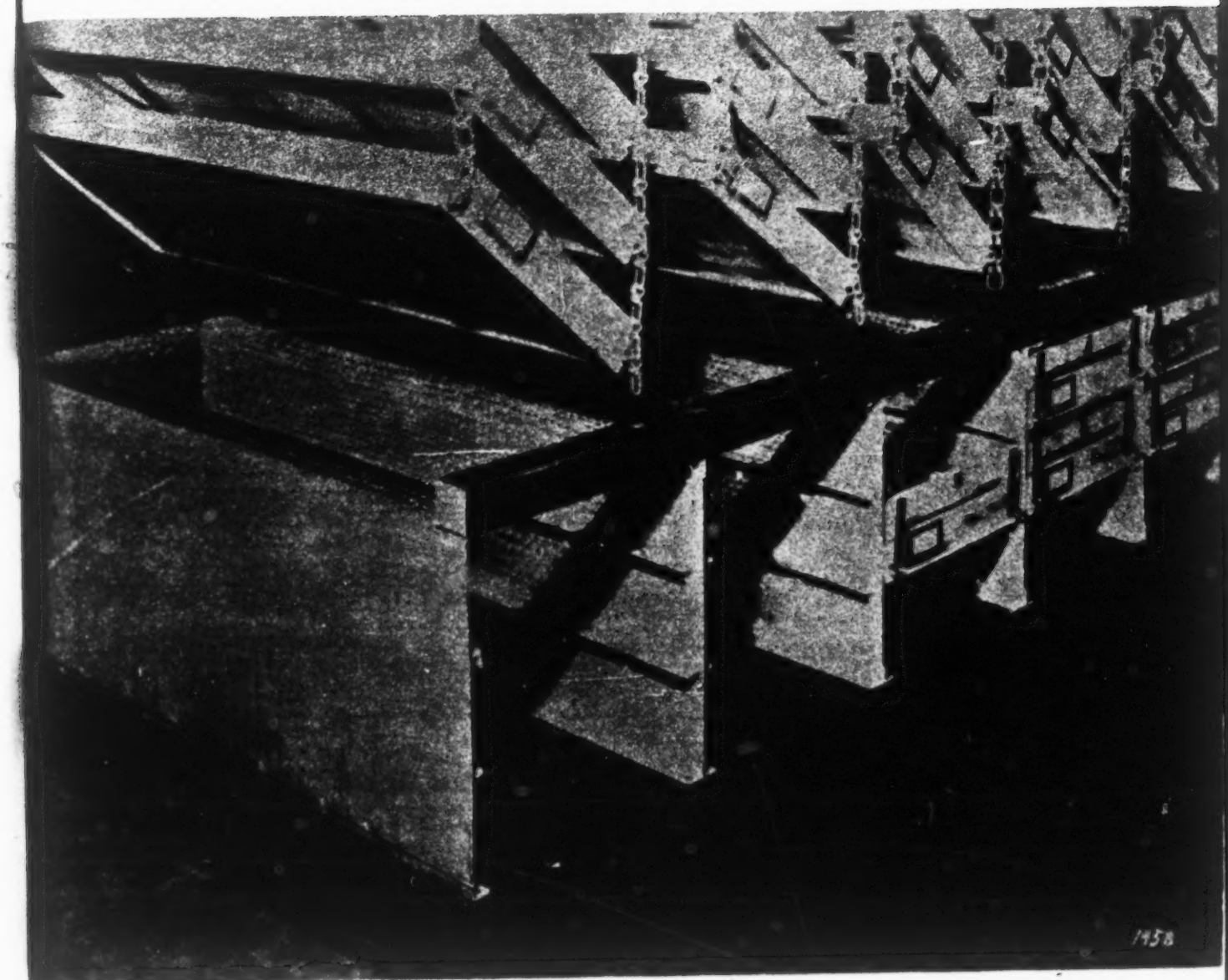
Plaintiff's Exhibit 10C



Plaintiff's Exhibit 10 D

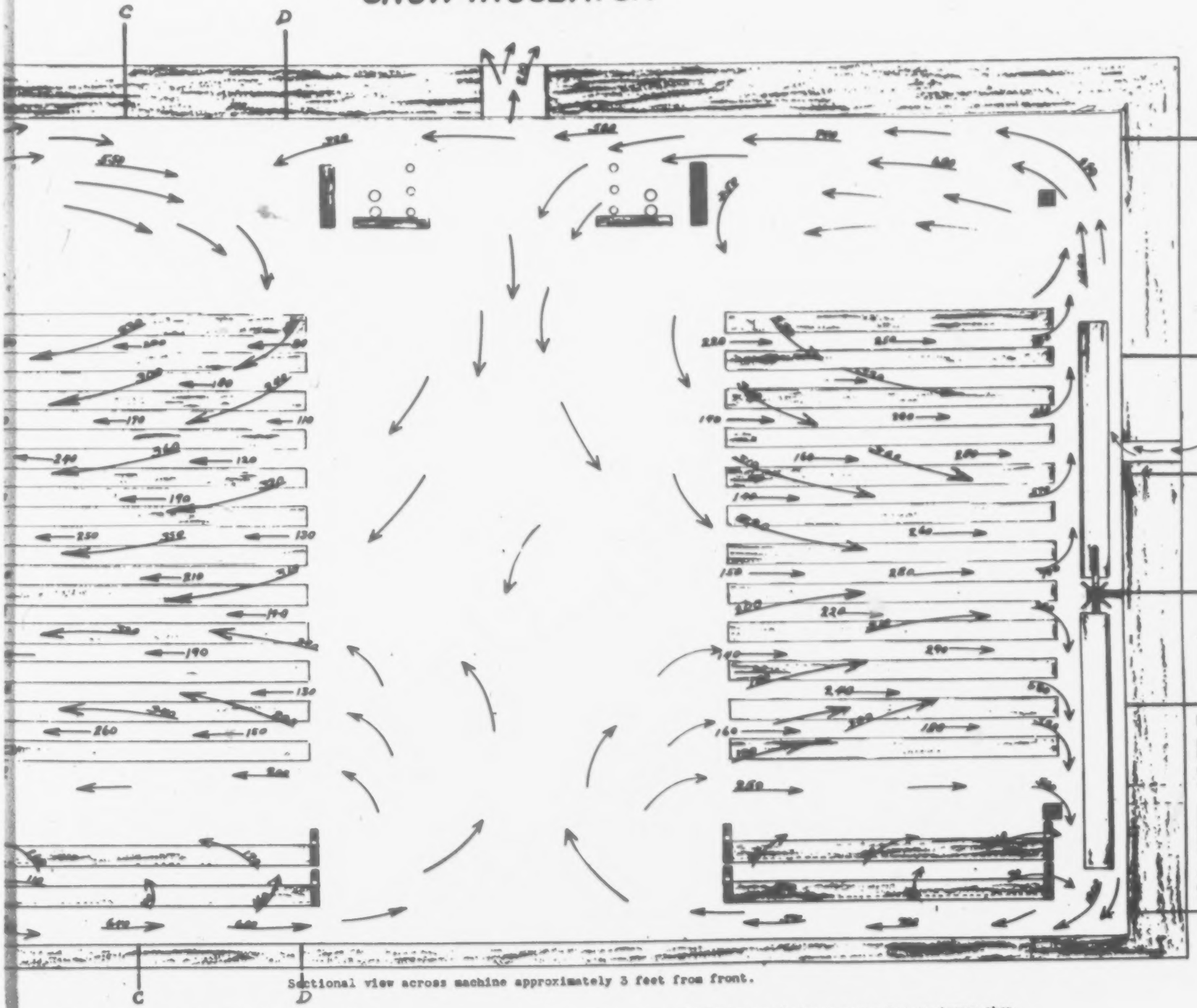


Plaintiff's Exhibit 10E



680 Plaintiff's Exhibit.
No. 11 (Catalog)
To Be Treated And Dealt With
Under Provisions Of C. C. A.
Rule 34.

SNOW-INCUBATOR



Sectional view across machine approximately 3 feet from front.

Arrows show general direction of air currents. Numbers give approximate speed of currents as recorded by anemometer.

Readings in lower two trays were taken with the anemometers in the trays.

Fans were rotating counter clockwise 1038-1210

260

310

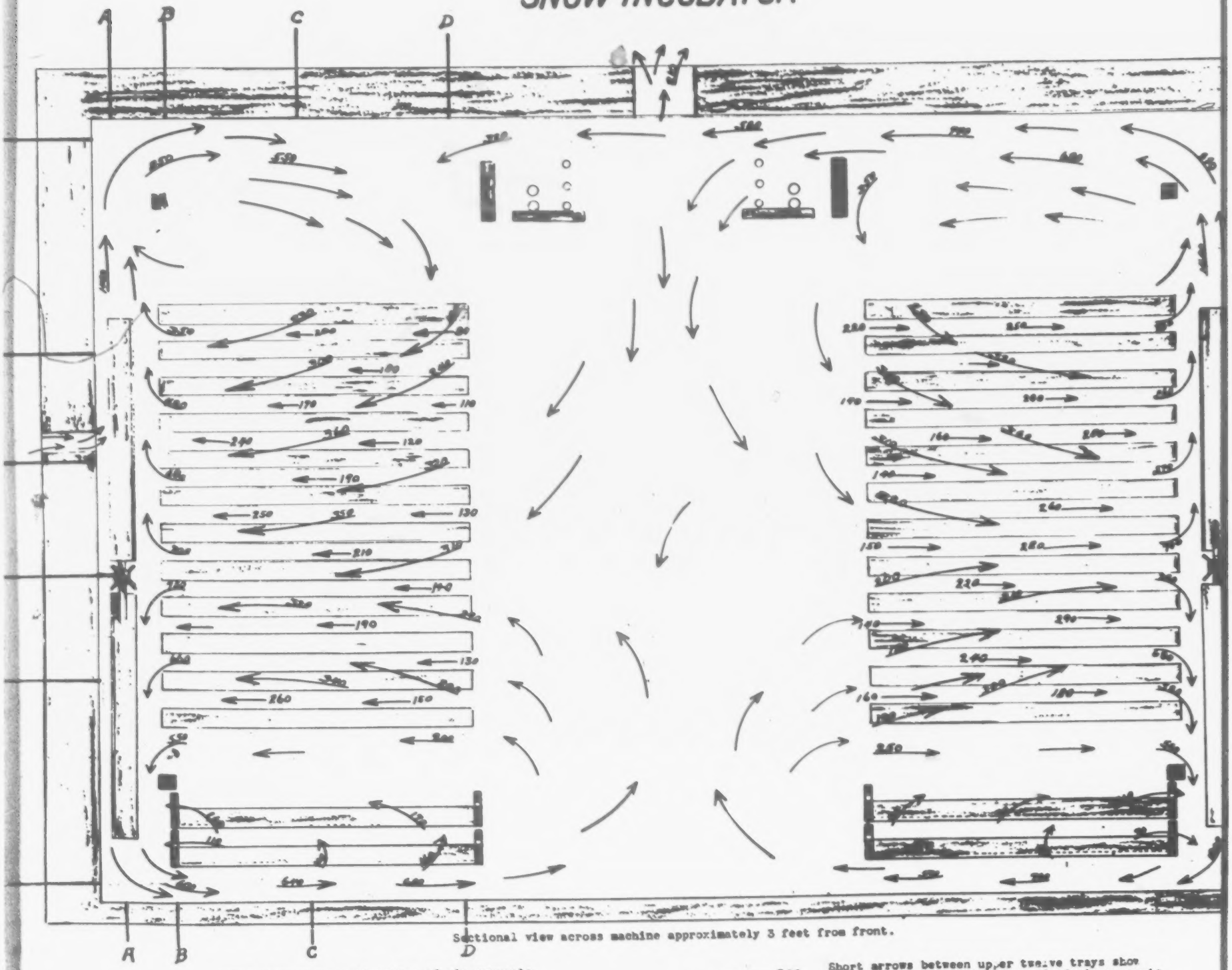
Short arrows between upper twelve trays show direction and approximate speed of air currents near center of trays. In these readings, the anemometer was placed in the trays in normal operating position.

Long arrows sweeping across sides of upper twelve trays show currents between tray columns.

Pfs. Ex. 12

473

SNOW-INCUBATOR



Sectional view across machine approximately 3 feet from front.

Arrows show general direction of air currents. Numbers give approximate speed of currents as recorded by anemometer.

Readings in lower two trays were taken with the anemometers in the trays.

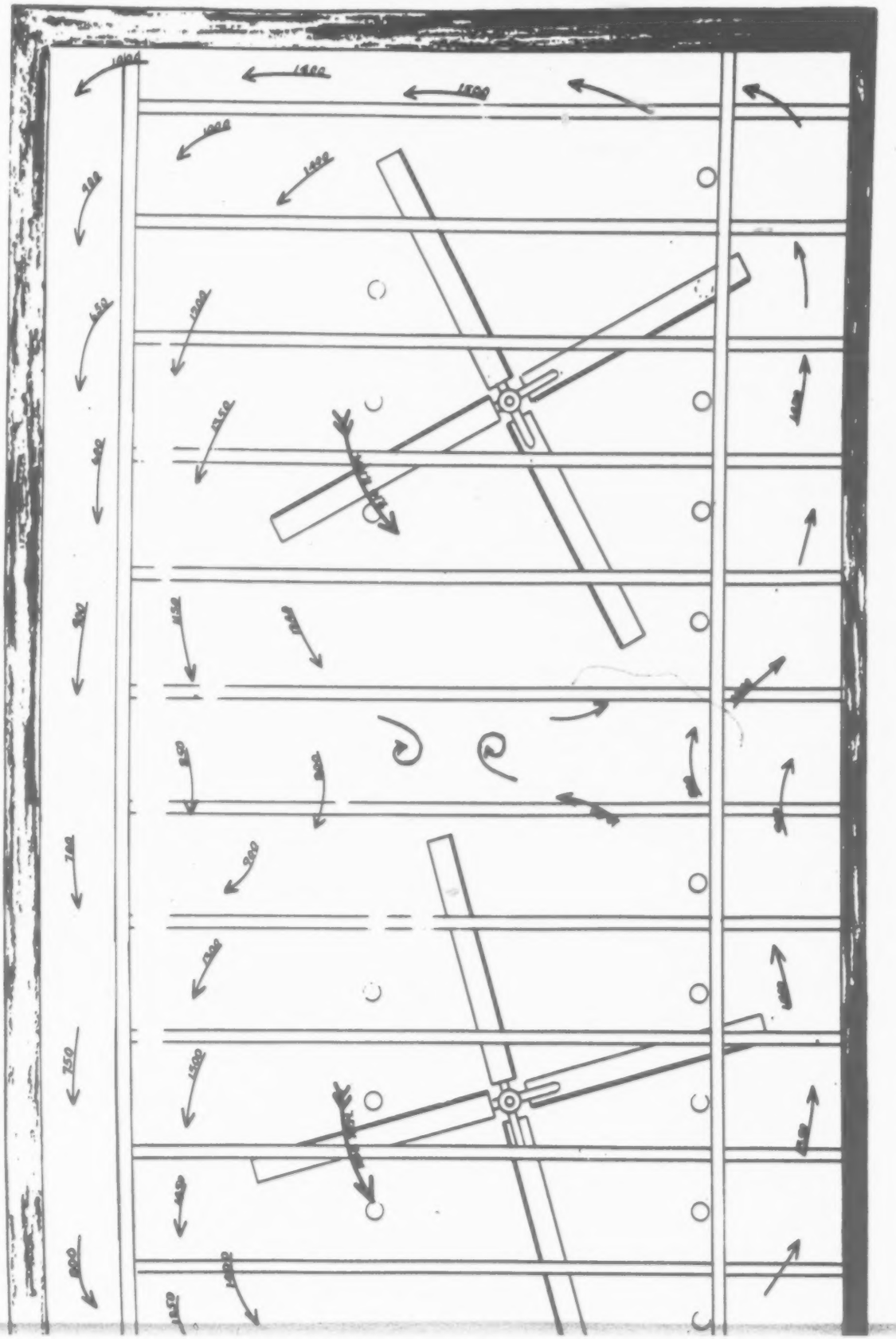
Fans were rotating counter clockwise 200-210 R.P.M.

Short arrows between upper twelve trays show direction and approximate speed of air currents near center of trays. In these readings, the anemometer was placed in the trays in normal operating position.

Long arrows sweeping across sides of upper twelve trays show currents between tray columns.

Plaintiff's Exhibit 12AA

SNOW INCUBATOR



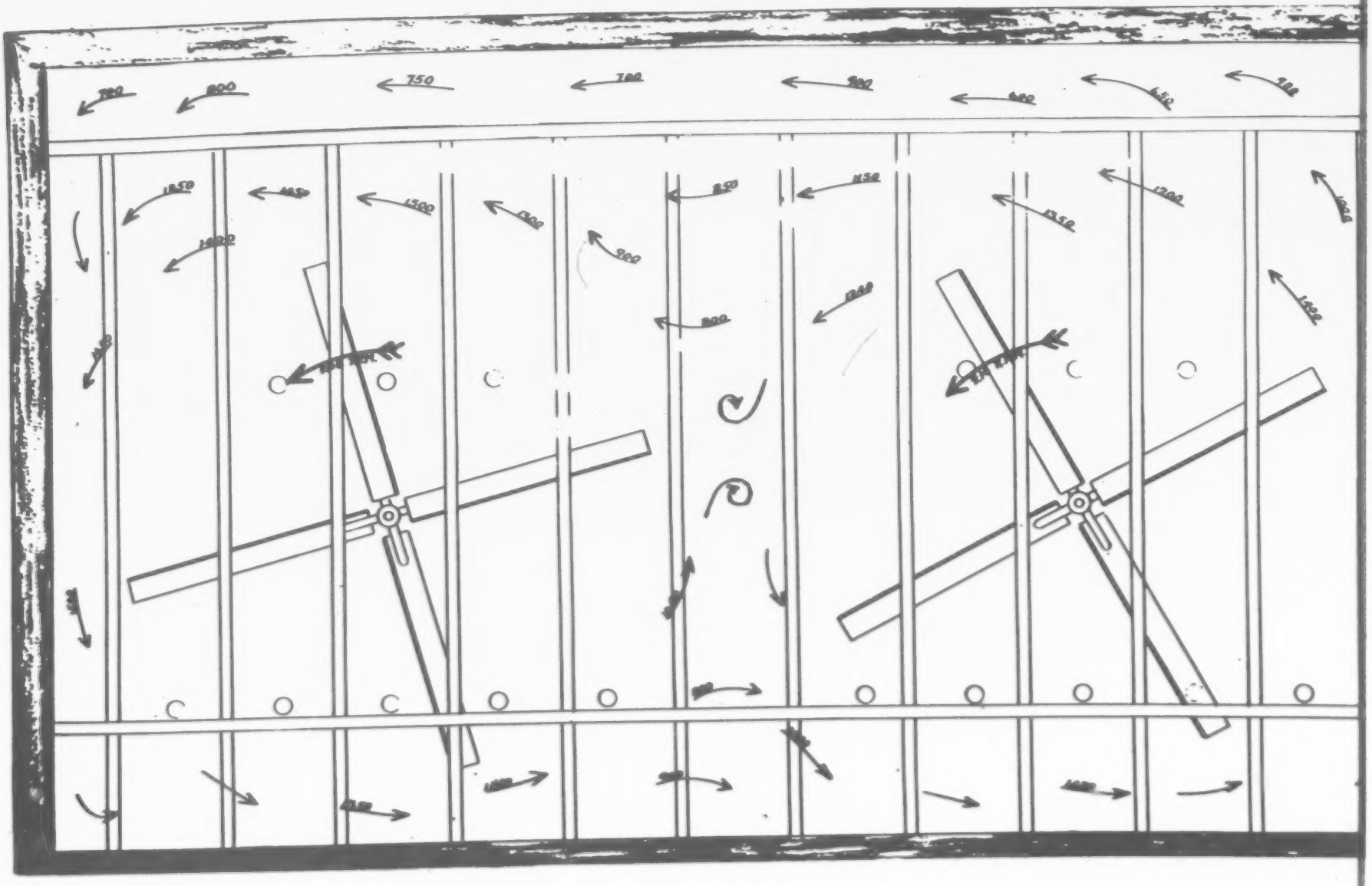
Sectional view in plane of fans. A A

Note: The construction of fans and their direction of rotation would indicate that they should throw the air forward from fan, but they rotate so close to the wall that they cannot feed from behind. As mounted, their speed throws the air off the ends of the blades centrifugally and the air flows into the fans over the entire front surface. Running at 200 to 250 R.P.M. each of these fans moves approximately 6000 cubic feet per minute.

Arrows show direction of air currents on wall of incubator. Figures on arrows show approximate speed of currents as recorded by anemometers.

Large arrows on fans show direction of rotation and revolutions per minute.

SNOW INCUBATOR



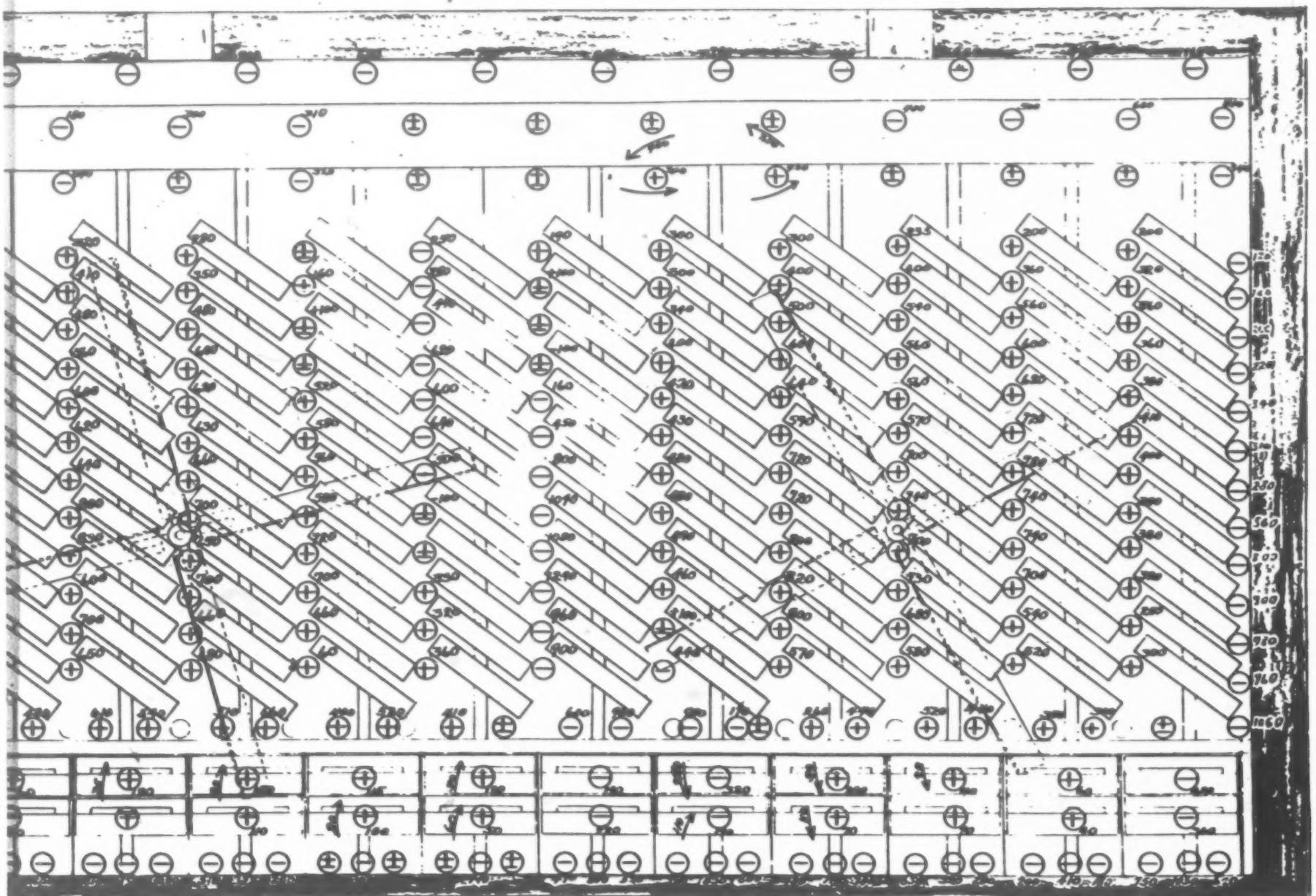
Sectional view in plane of fans. A A

Arrows show direction of air currents on wall of incubator. Figures on arrows show approximate speed of currents as recorded by anemometers.

Large arrows on fans show direction of rotation and revolutions per minute.

Note: The construction of fans and their direction of rotation would indicate that they should throw the air forward from fan, but they rotate so close to the wall that they cannot feed from behind. As mounted, their speed throws the air off the ends of the blades centrifugally and the air flows into the fans over the entire front surface. Running at 800 to 810 R.P.M. each of these fans throws approximately 8000 cubic feet per minute.

SNOW INCUBATOR



Sectional view in plane parallel to fans and approximately six inches in front of fans. B B

⊕ 100 ⊖ — Shows position of anemometer, direction of air flow, and approximate speed of currents.

⊖ — Air flowing away from fan.

⊕ — Air flowing to the fan.

⊖ 150 — Approximate speed of air current in lineal feet per minute as recorded by anemometer.

⊕ — Anemometer does not run steadily in one direction when placed in this position.

← 100 Arrows show cross current to anemometer. The numbers give their approximate speed.

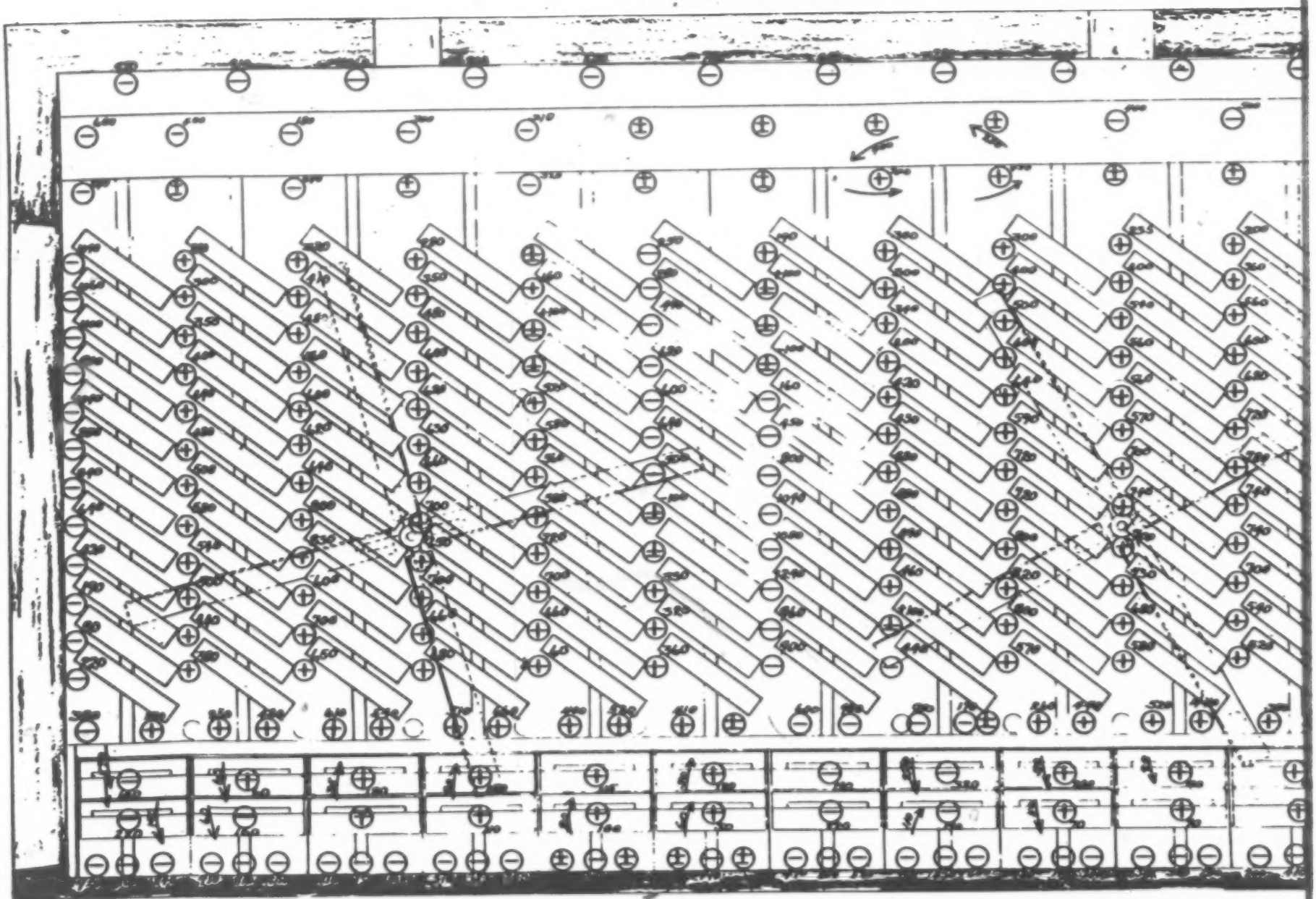
In this sectional view all readings were taken with the anemometers parallel to the fans with the exception of the twelve readings along the ceiling. These twelve were taken with the anemometer at right angles to the current. Readings at side of turning trays were taken approximately three inches from rear of the trays. Readings in hatching trays were taken four inches from rear of trays. All other readings were taken in the plane of the rear end of trays.

Fans were rotating counter clockwise 208-210 R.P.M.

Plfs. Ex. 12 B B

477

SNOW INCUBATOR



Sectional view in plane parallel to fans and approximately six inches in front of fans. B B

⊕ 100 − Shows position of anemometer, direction of air flow, and approximate speed of currents.

⊖ − Air flowing away from fan.

⊕ − Air flowing to the fan.

⊖ 100 − Approximate speed of air current in lineal feet per minute as recorded by anemometer.

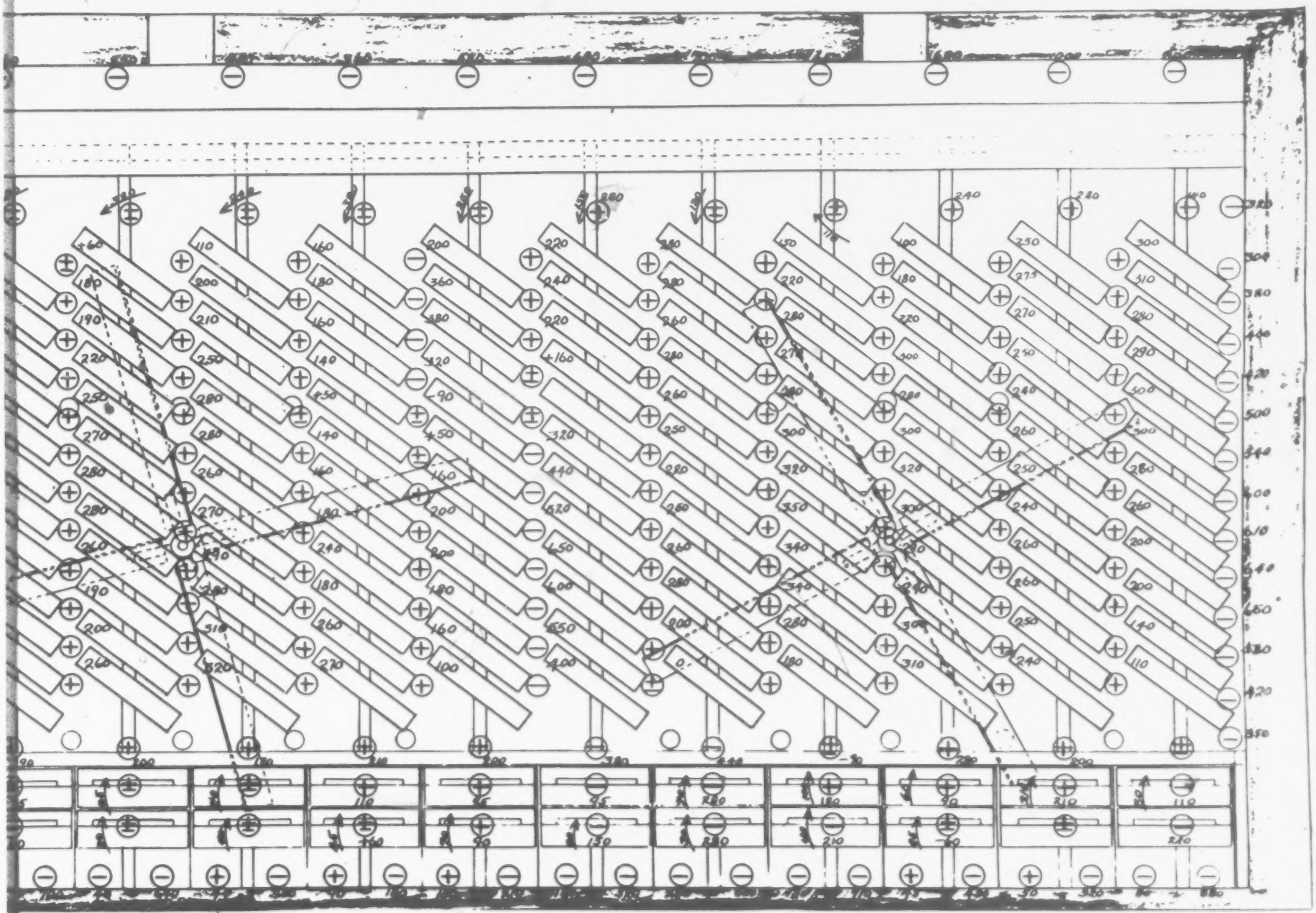
⊕ − Anemometer does not run steadily in one direction when placed in this position.

← 100 Arrows show cross current to anemometer. The numbers give their approximate speed.

In this sectional view all readings were taken with the anemometers parallel to the fans with the exception of the twelve readings along the ceiling. These twelve were taken with the anemometer at right angles to the current. Readings at side of turning trays were taken approximately three inches from rear of the trays. Readings in hatching trays were taken four inches from rear of trays. All other readings were taken in the plane of the rear end of trays.

Fans were rotating counter clockwise 206-210 R.P.M.

SNOW INCUBATOR



Sectional view in plane parallel to fans and midway between front and rear of the trays. C C

⊕ 100 – Shows position of anemometer, direction of air flow, and approximate speed of air currents.

⊖ – Air flowing away from fan.

⊕ – Air flowing to the fan.

⊖ 100 – Approximate speed of air current in lineal feet per minute as recorded by anemometer.

⊕ – Anemometer does not run steadily in one direction

← 100 Arrows show cross current to anemometer. The numbers give their approximate speed.

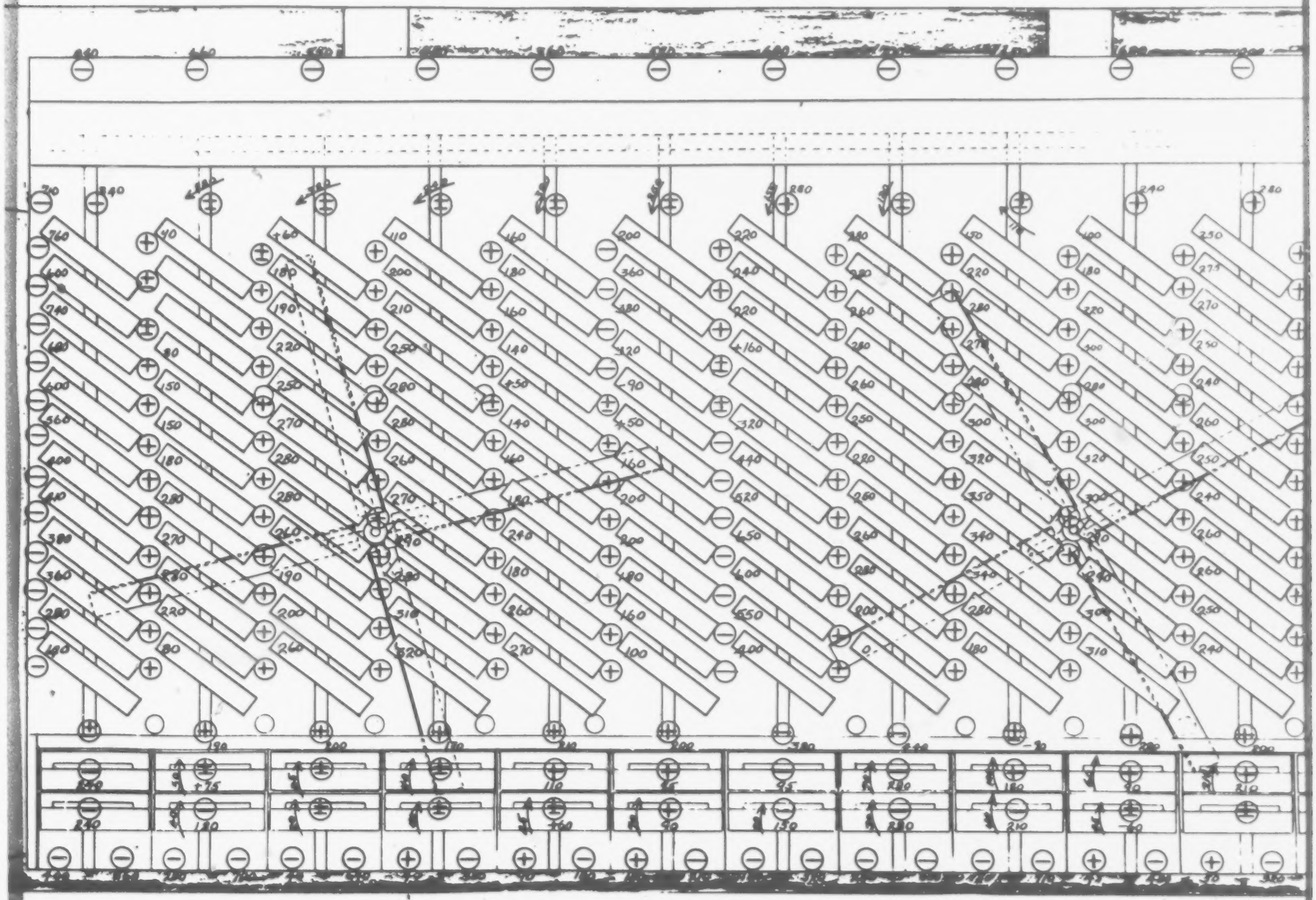
In this sectional view all readings were taken midway between the front and rear of the trays and with the anemometer parallel to the fans with the exception of the twelve along the ceiling. These twelve were taken with the anemometer at right angles to the current.

Fans were rotating counter clockwise 208-210 R.P.M.

Plfs. Ex. 12CC

479

SNOW INCUBATOR



Sectional view in plane parallel to fans and midway between front and rear of the trays. C C

⊕ 100 – Shows position of anemometer, direction of air flow, and approximate speed of air currents.

⊖ – Air flowing away from fan.

⊕ – Air flowing to the fan.

⊖ 100 – Approximate speed of air current in lineal feet per minute as recorded by anemometer.

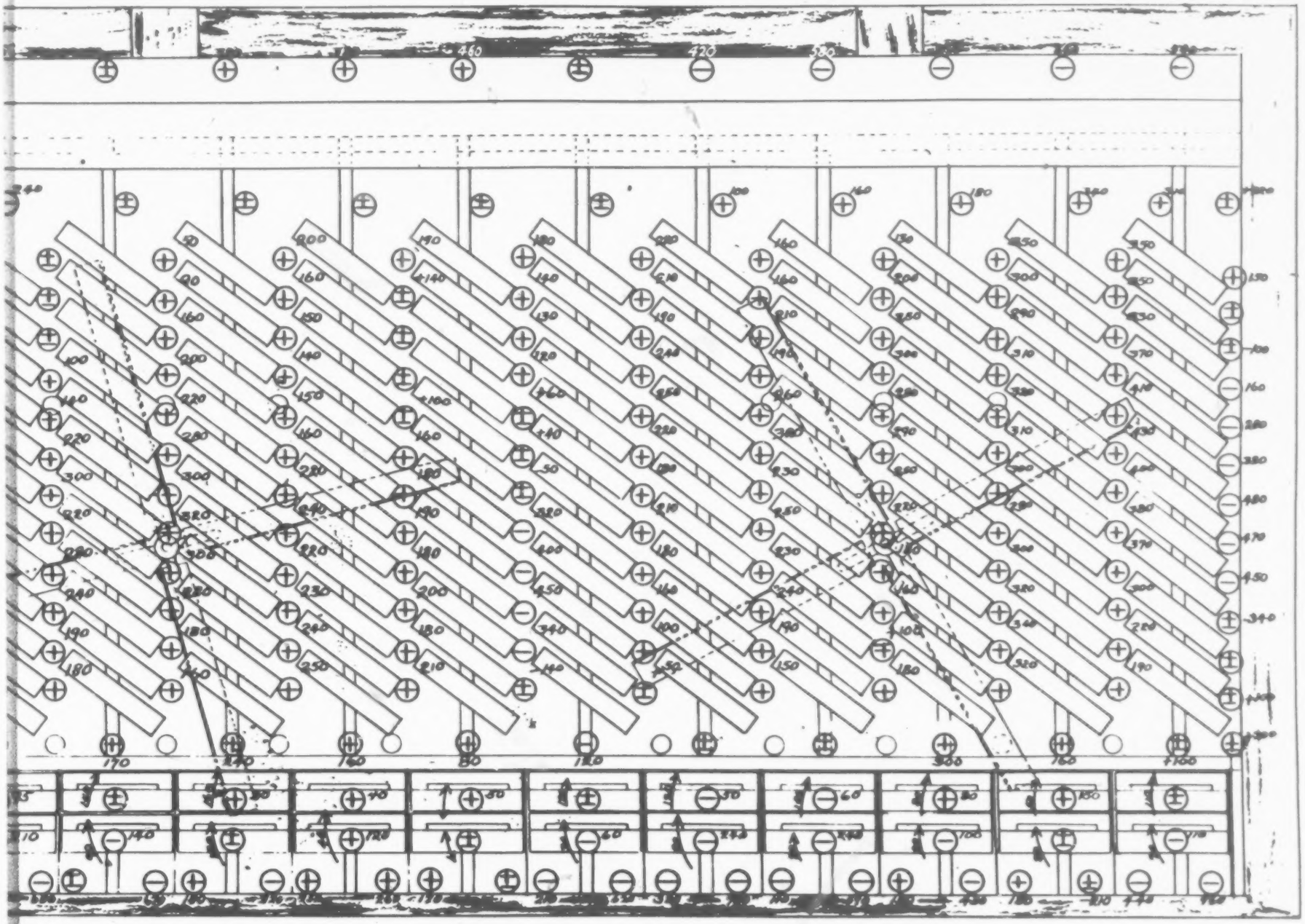
⊕ – Anemometer does not run steadily in one direction when placed in this position.

← 100 Arrows show cross current to anemometer. The numbers give their approximate speed.

In this sectional view all readings were taken midway between the front and rear of the trays and with the anemometer parallel to the fans with the exception of the twelve along the ceiling. These twelve were taken with the anemometer at right angles to the current.

Fans were rotating counter clockwise 208-210 R.P.M.

SNOW INCUBATOR



Sectional view in plane parallel to fans and near front of trays. D D

⊕ 100 — Shows position of anemometer, direction of air flow, and approximate speed of air currents.

⊖ — Air flowing away from fan.

⊕ — Air flowing to the fan.

⊖ 100 — Approximate speed of air current in lineal feet per minute as recorded by anemometer.

⊕ — Anemometer does not run steadily in one direction

← 120 Arrows show cross current to anemometer. The numbers give their approximate speed.

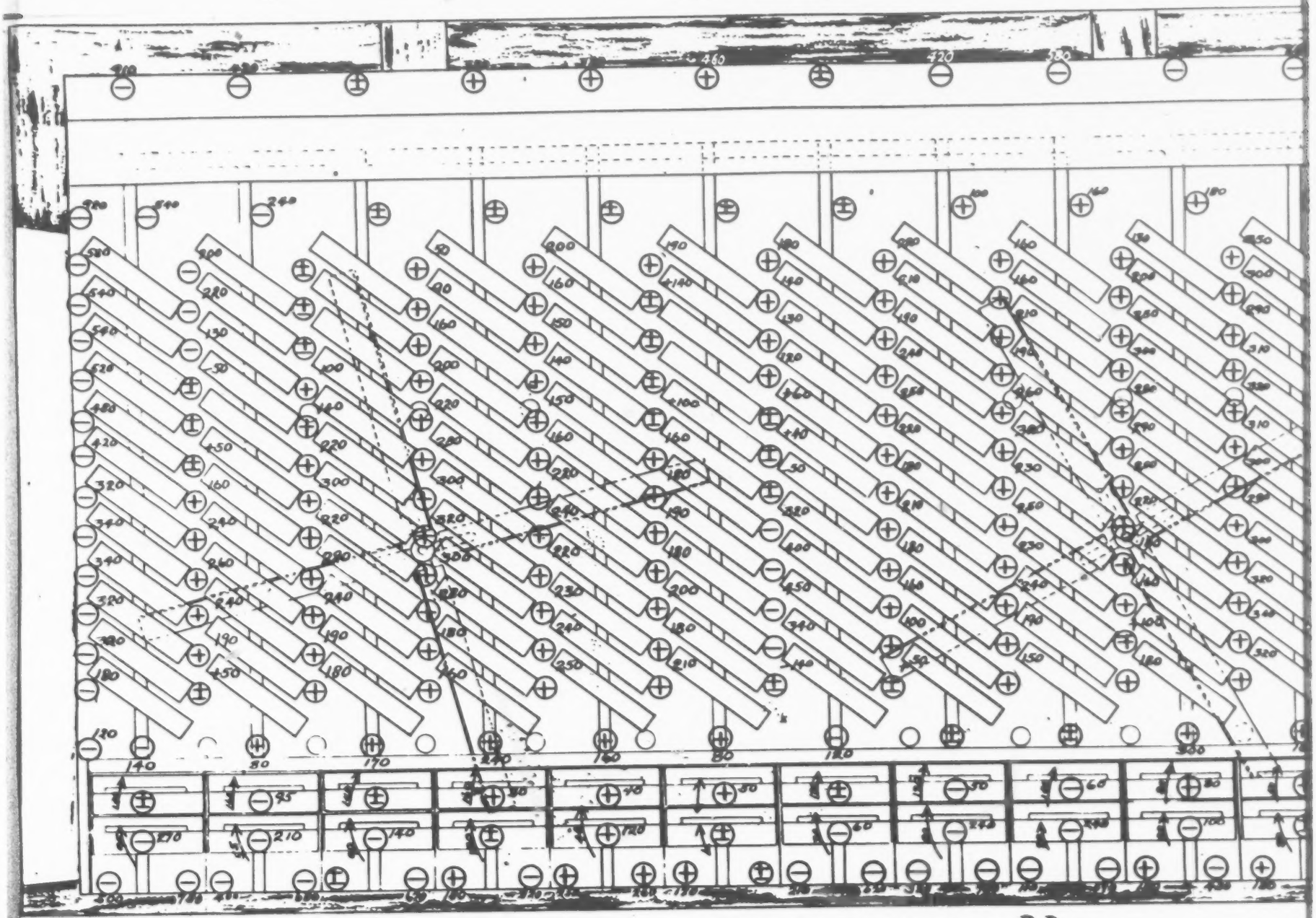
In this sectional view all readings were taken with the anemometer parallel to the fans. Readings at the side of the turning trays were taken approximately three inches from front of trays. Readings in the hatching racks were taken four inches from front of trays. All other readings were taken in the plan of the front of the trays.

Fans were rotating counter clockwise 208-210 R.P.M.

Plfs. Ex. 12DD

481

SNOW INCUBATOR



Sectional view in plane parallel to fans and near front of trays. D D

⊕ 100 — Shows position of anemometer, direction of air flow, and approximate speed of air currents.

⊖ — Air flowing away from fan.

⊕ — Air flowing to the fan.

⊖ 100 — Approximate speed of air current in lineal feet per minute as recorded by anemometer.

⊕ — Anemometer does not run steadily in one direction when placed in this position.

← 120 Arrows show cross current to anemometer. The numbers give their approximate speed.

In this sectional view all readings were taken with the anemometer parallel to the fans. Readings at the side of the turning trays were taken approximately three inches from front of trays. Readings in the hatching racks were taken four inches from front of trays. All other readings were taken in the plan of the front of the trays.

Fans were rotating counter clockwise 208-210 R.P.M.

SNOW-INCUBATOR

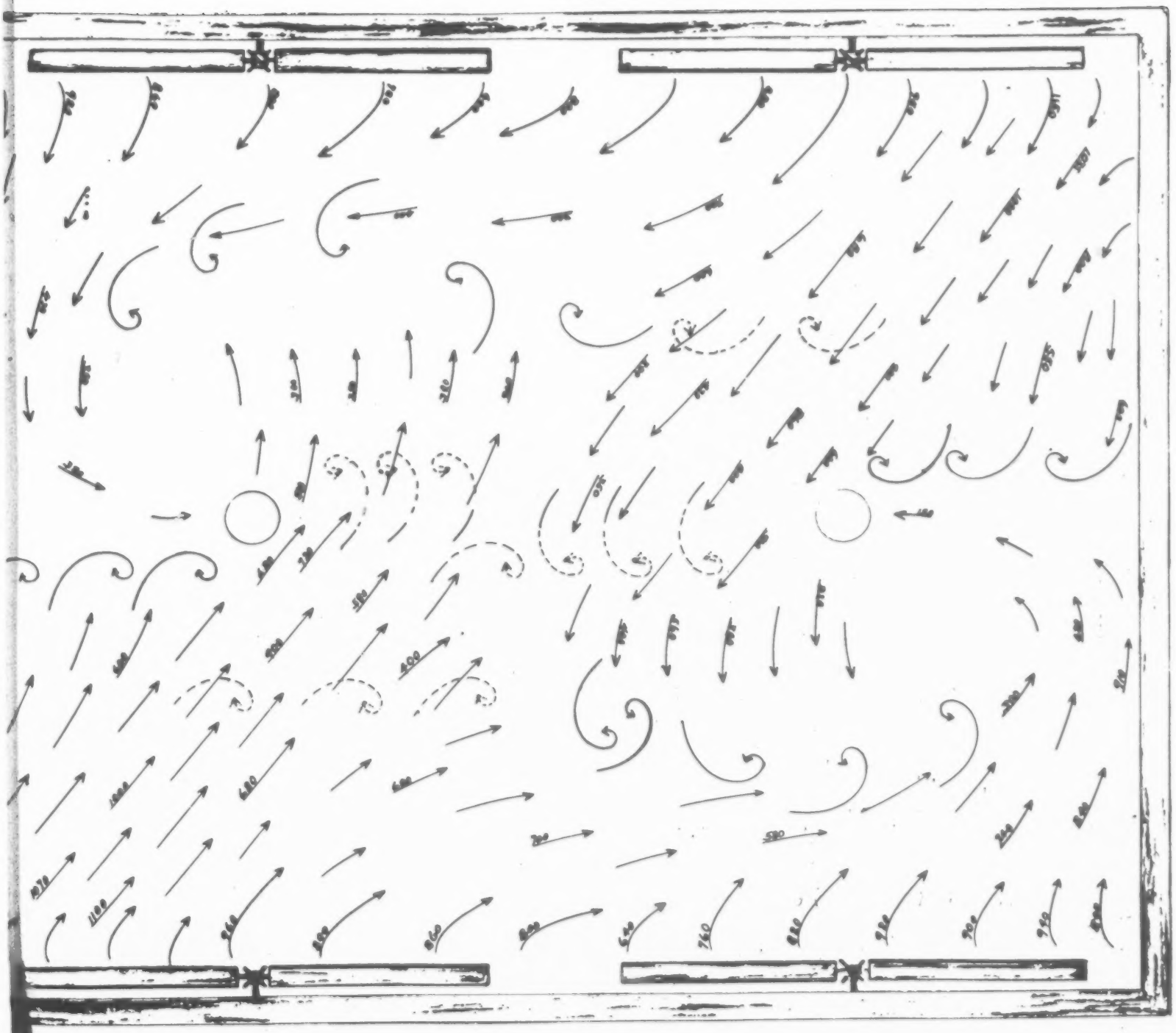


Diagram of air currents along roof of incubator as if viewed from above through roof. EE

EE

Plaintiff's Exhibit 12 EE

SNOW-INCUBATOR

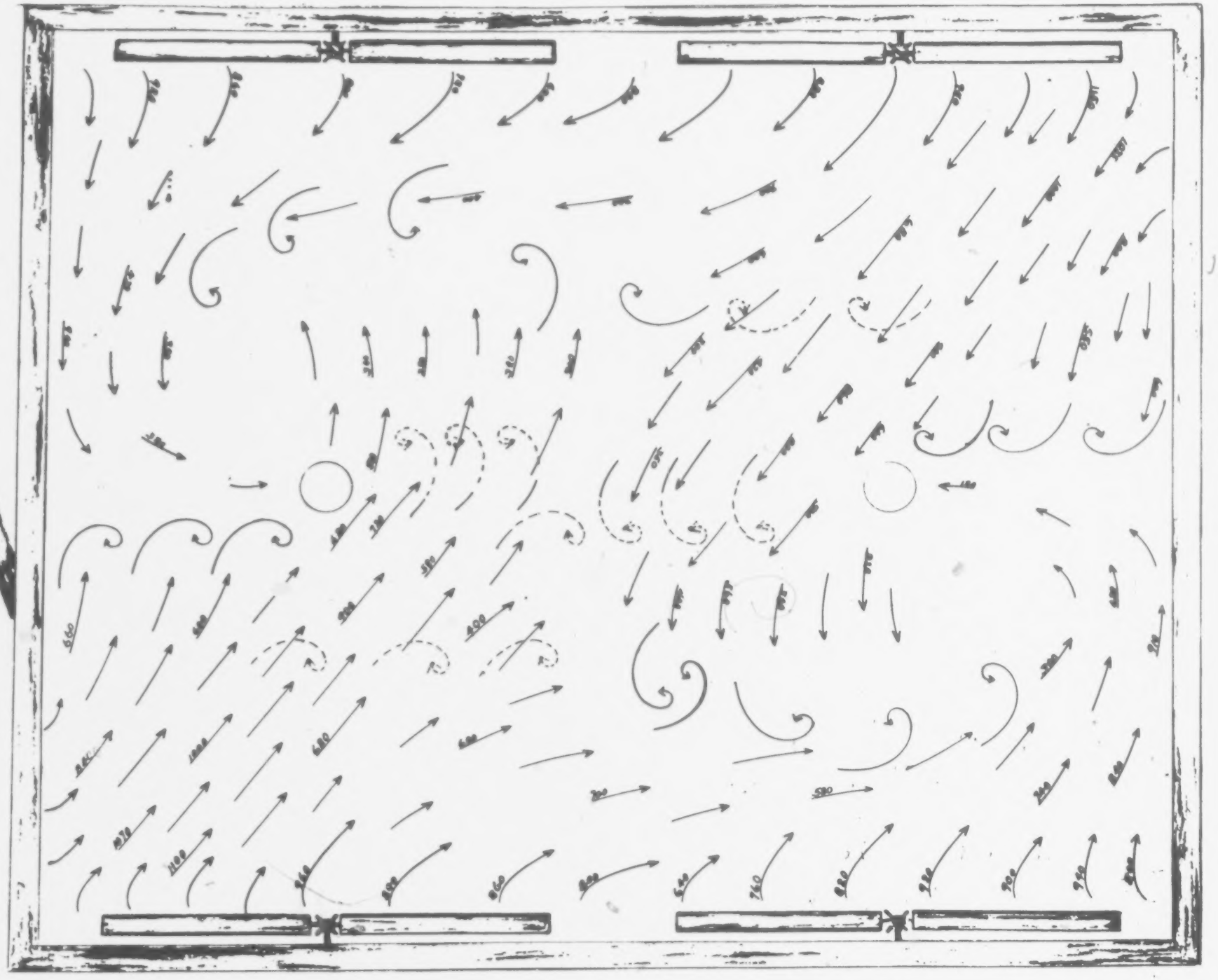
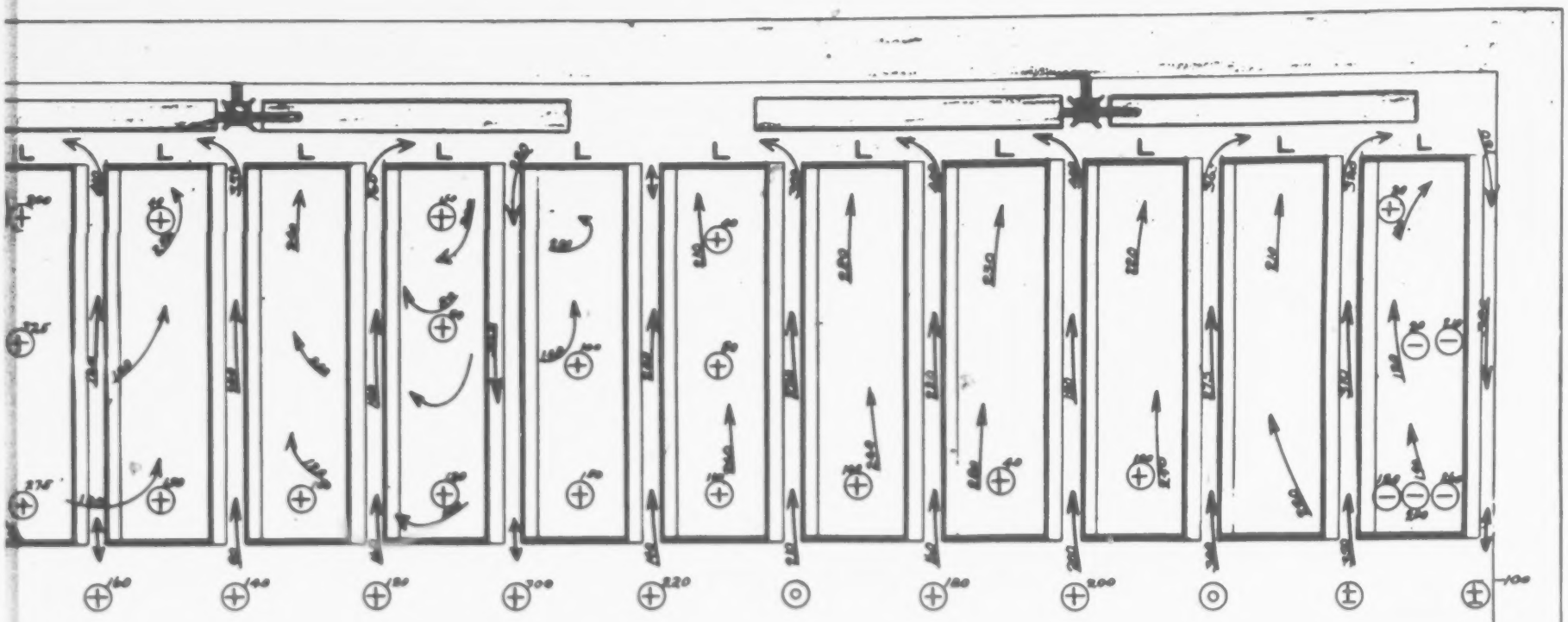


Diagram of air currents along roof of incubator as if viewed from above through roof. E E

SNOW-INCUBATOR



Horizontal section on left side of incubator in plane of 2nd tray from top. F F

⊕ 100 – Circles in trays give position and reading of anemometers when placed flat on bottom of tray.

⊕ – Plus reading indicates air moving downward through bottom of tray.

⊖ – Minus means air moves upward.

⊕ – Plus or minus indicates anemometer does not run steadily in one direction when in this position.

⊙ – Zero means no movement.

A – Anemometer readings shown in this line were taken between tray columns at edge of corridor, making anemometer parallel to floor of incubator.

While collecting data for this diagram, trays were turned approximately 45 degrees from horizontal with left side dorn or with trays opposite to position shown in "Sectional view in plane of fans".

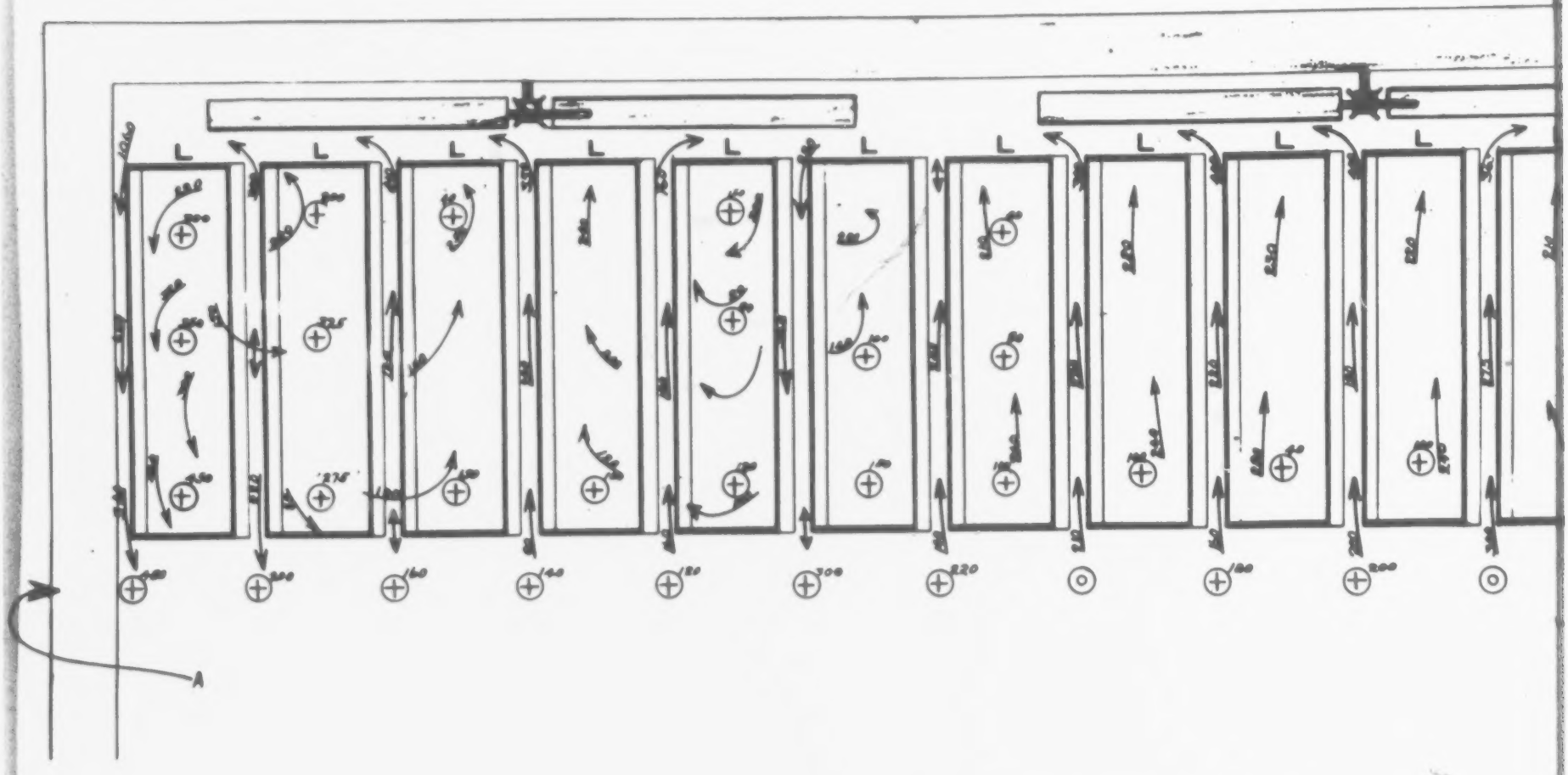
Readings between trays were taken with anemometers parallel to fans.

Arrows in trays show general direction and approximate speed of air currents passing through tray columns.

Fans were rotating counter clockwise 206-210 R. P. M.

Plfs. Ex. 12FF

SNOW-INCUBATOR



Horizontal section on left side of incubator in plane of 2nd tray from top. F F

⊕ 100 − Circles in trays give position and reading of anemometers when placed flat on bottom of tray.

⊕ − Plus reading indicates air moving downward through bottom of tray.

⊖ − Minus means air moves upward.

⊕⊖ − Plus or minus indicates anemometer does not run steadily in one direction when in this position.

⊙ − Zero means no movement.

A − Anemometer readings shown in this line were taken between tray columns at edge of corridor, holding anemometer parallel to floor of incubator.

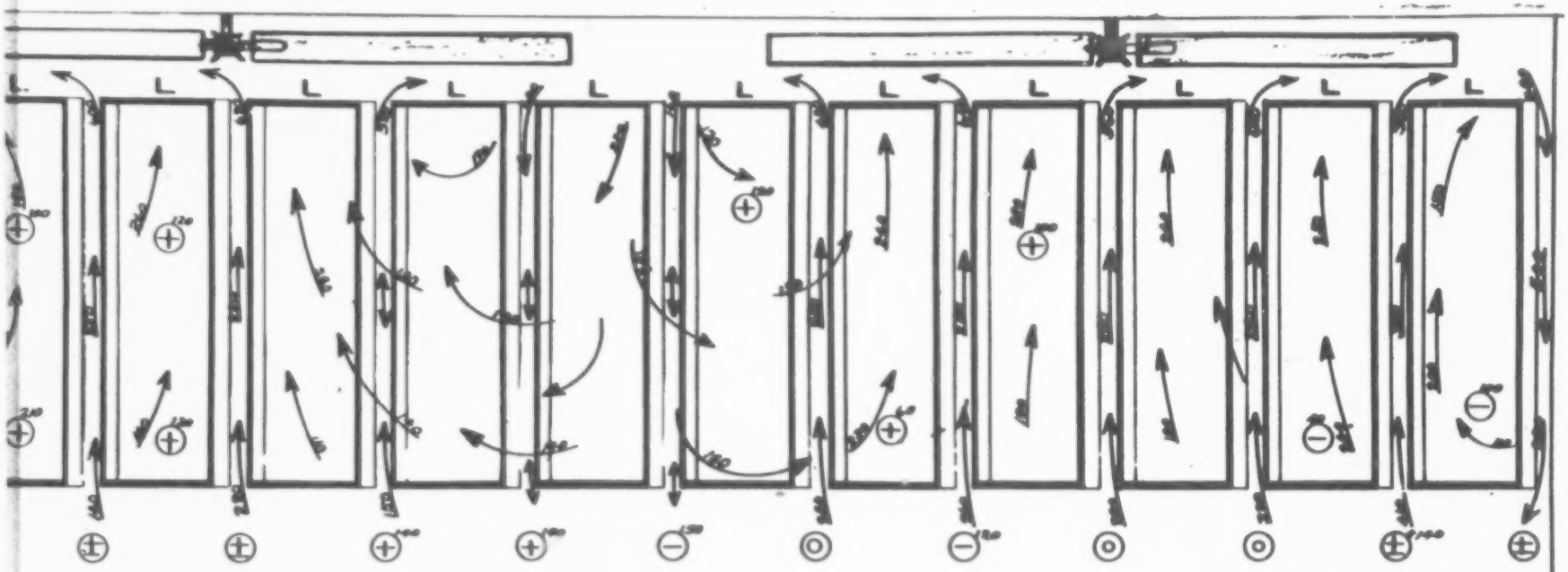
While collecting data for this diagram, trays were turned approximately 45 degrees from horizontal with left side down or with trays opposite to position shown in "Sectional view in plane of fans".

Readings between trays were taken with anemometers parallel to fans.

Arrows in trays show general direction and approximate speed of air currents passing through tray columns.

Fans were rotating counter clockwise 206-210 R. P. M.

SNOW-INCUBATOR



Horizontal section on left side of incubator in plane of 5th tray from top. G G

⊕ 100 – Circles in trays give position of reading of anemometers when placed flat on bottom of tray.

⊕ – Plus reading indicates air moving downward through bottom of tray.

⊖ – Minus means air moves upward.

⊕ – Plus or minus indicates anemometer does not run steadily in one direction when in this position.

◎ – Zero means no movement.

A – Anemometer readings shown in this line were taken between trays columns at edge of corridor, holding anemometer parallel to floor of incubator.

While collecting data for this diagram, trays were turned approximately 45 degrees from horizontal with left side down or with trays opposite to position shown in "Sectional view in plane of fans".

Readings between trays were taken with anemometers parallel to fans.

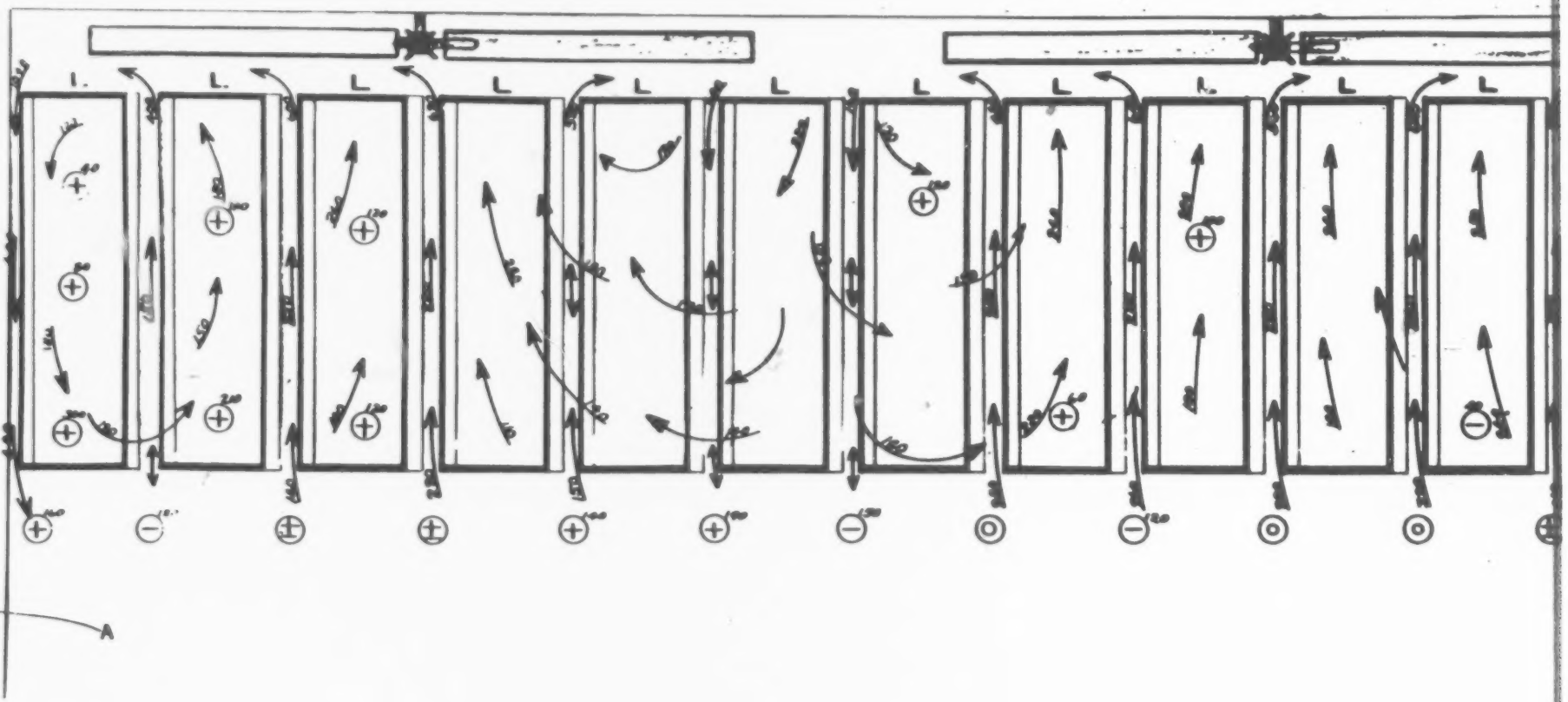
Arrows in trays show general direction and approximate speed of air currents passing through tray columns.

Fans were rotating counter clockwise 830-840 R. P. M.

Pfs. Ex. 12 GG

487

SNOW-INCUBATOR



Horizontal section on left side of incubator in plane of 5th tray from top. 4 6

⊕ 100 –	Circles in trays give position of reading of anemometers when placed flat on bottom of tray.
⊕ –	Plus reading indicates air moving downward through bottom of tray.
⊖ –	Minus means air moves upward.
± –	Plus or minus indicates anemometer does not run steadily in one direction when in this position.
⊙ –	Zero means no movement.
A –	Anemometer readings shown in this line were taken between trays columns at edge of corridor, holding anemometer parallel to floor of incubator.

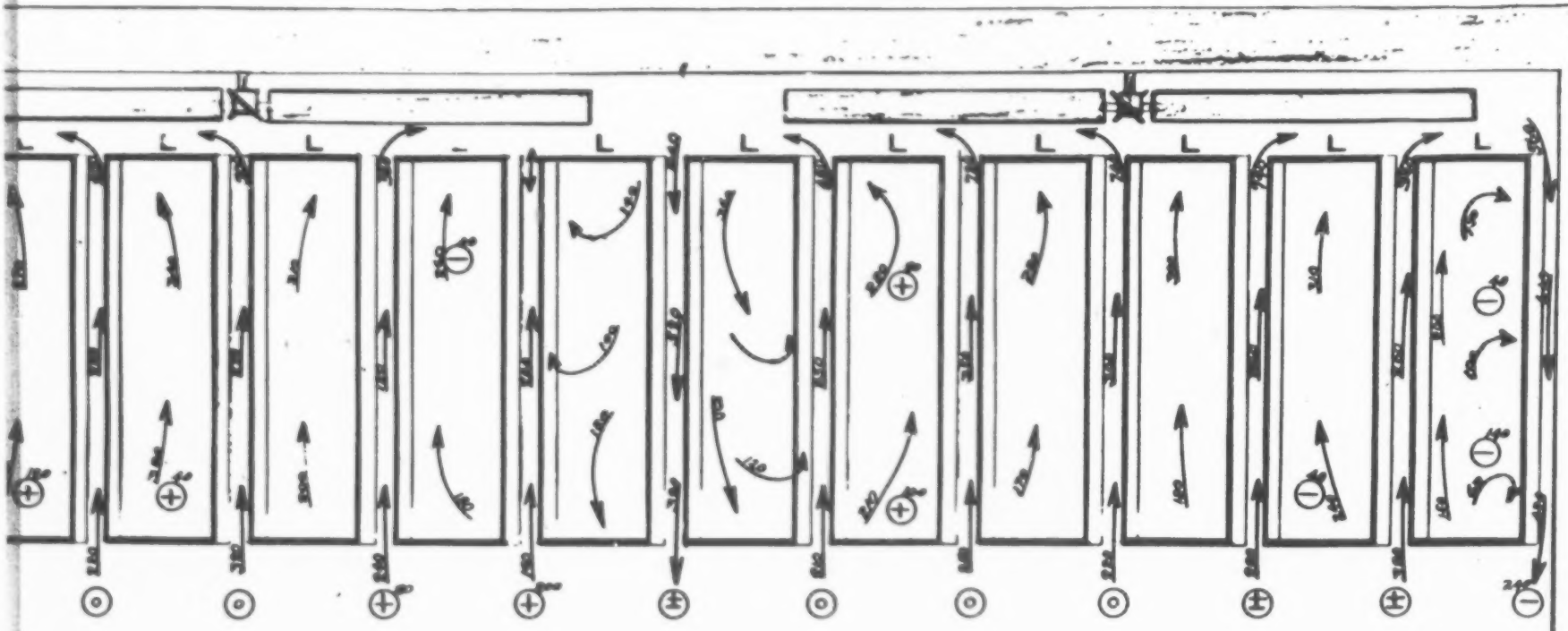
While collecting data for this diagram, trays were turned approximately 45 degrees from horizontal with left side down or with trays opposite to position shown in "Sectional view in plane of fans".

Readings between trays were taken with anemometers parallel to fans.

Arrows in trays show general direction and approximate speed of air currents passing through tray columns.

Fans were rotating counter clockwise 208-210 R. P. M.

SNOW-INCUBATOR



Horizontal section on left side of incubator in plane of 8th tray from top. H H

⊕ 100. ⊖ – Circles in trays give position and reading of anemometers when placed flat on bottom of tray.

⊕ – Plus reading indicates air moving downward through bottom of tray.

⊖ – Minus means air moves upward.

⊜ – Plus or minus indicates anemometer does not run steadily in one direction when in this position.

⊙ – Zero means no movement.

A – Anemometer readings shown in this line were taken between tray columns at edge of corridor, holding anemometer parallel to floor of incubator.

While collecting data for this diagram, trays were turned approximately 45 degrees from horizontal with left side down or with trays opposite to position shown in "Sectional view in plane of fans".

Readings between trays were taken with anemometers parallel to fans.

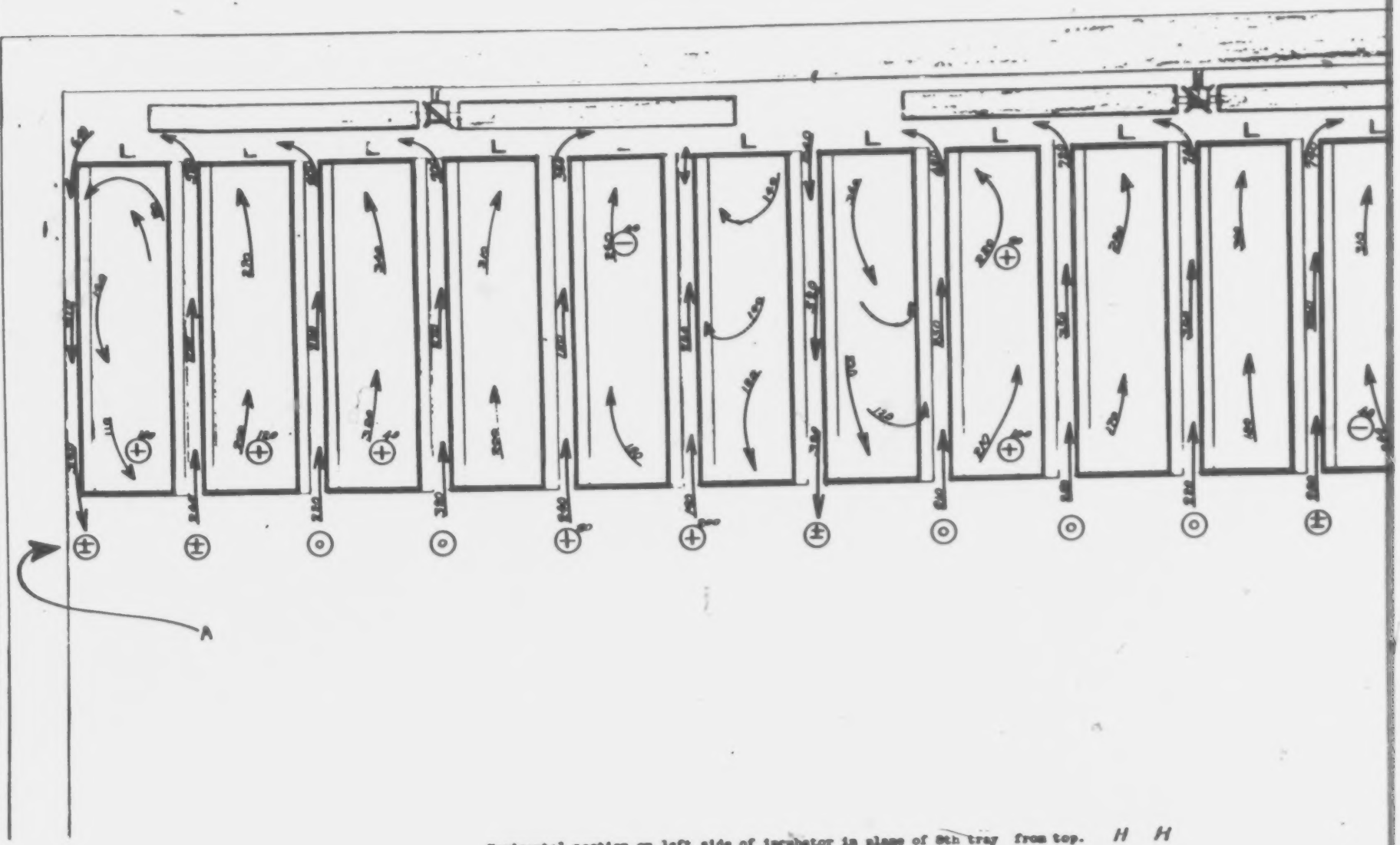
Arrows in trays show general direction and approximate speed of air currents passing through tray columns.

Fans were rotating counter clockwise 208-210 R. P. M.

Pfs. Ex. 12 HH

489

SNOW-INCUBATOR



Horizontal section on left side of incubator in plane of 8th tray from top. H H

⊕ 100 – Circles in trays give position and reading of anemometers when placed flat on bottom of tray.

⊕ – Plus reading indicates air moving downward through bottom of tray.

⊖ – Minus means air moves upward.

⊛ – Plus or minus indicates anemometer does not run steadily in one direction when in this position.

⊙ – Zero means no movement.

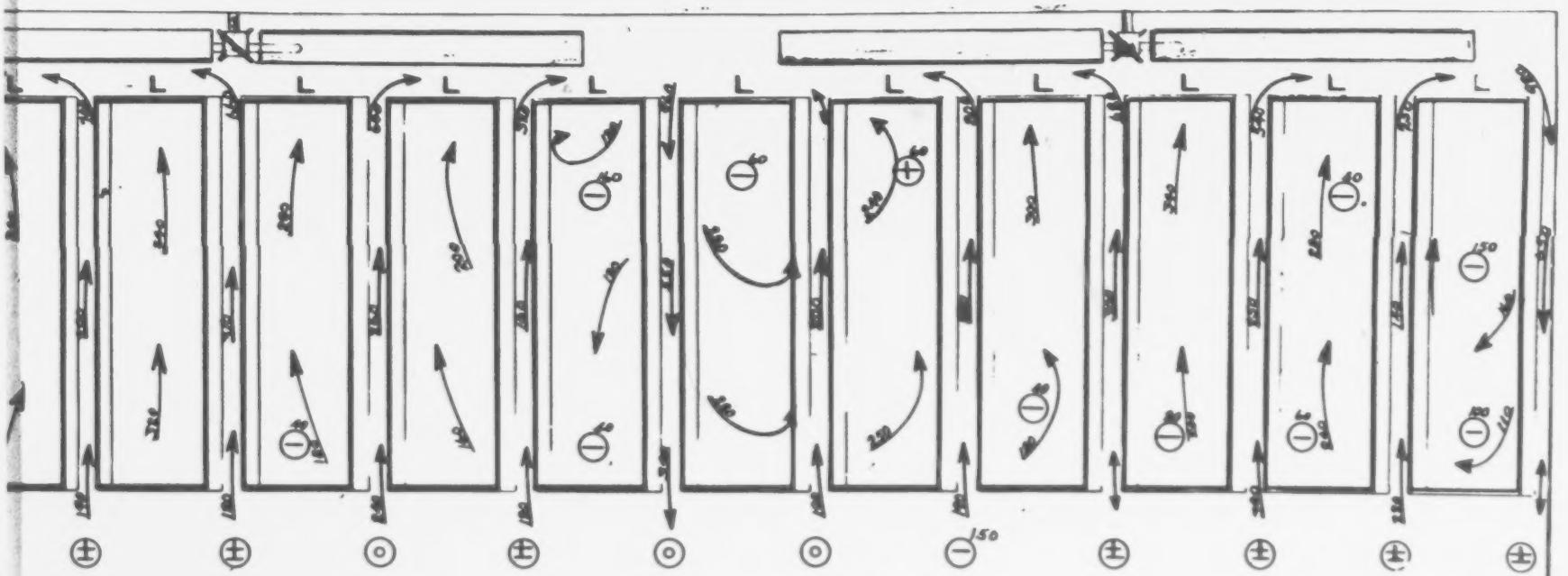
A – Anemometer readings shown in this line were taken between tray columns at edge of corridor, holding anemometer parallel to floor of incubator.

While collecting data for this diagram, trays were turned approximately 45 degrees from horizontal with left side down or with trays opposite to position shown in "Sectional view in plane of fans".

Readings between trays were taken with anemometers parallel to fans.

Arrows in trays show general direction and approximate speed of air currents passing through tray columns.

Fans were rotating counter clockwise 208-210 R. P. M.



Horizontal section on left side of incubator in plane of 11th tray from top. J J

⊕ 100 ⊖ – Circles in trays give position and reading of anemometers when placed flat on bottom of tray.

⊕ – Plus reading indicates air moving downward through bottom of tray.

⊖ – Minus means air moves upward.

⊜ – Plus or minus indicates anemometer does not run steadily in one direction when in this position.

⊙ – Zero means no movement.

A – Anemometer readings shown in this line were taken between tray columns at edge of corridor, holding anemometer parallel to floor of incubator.

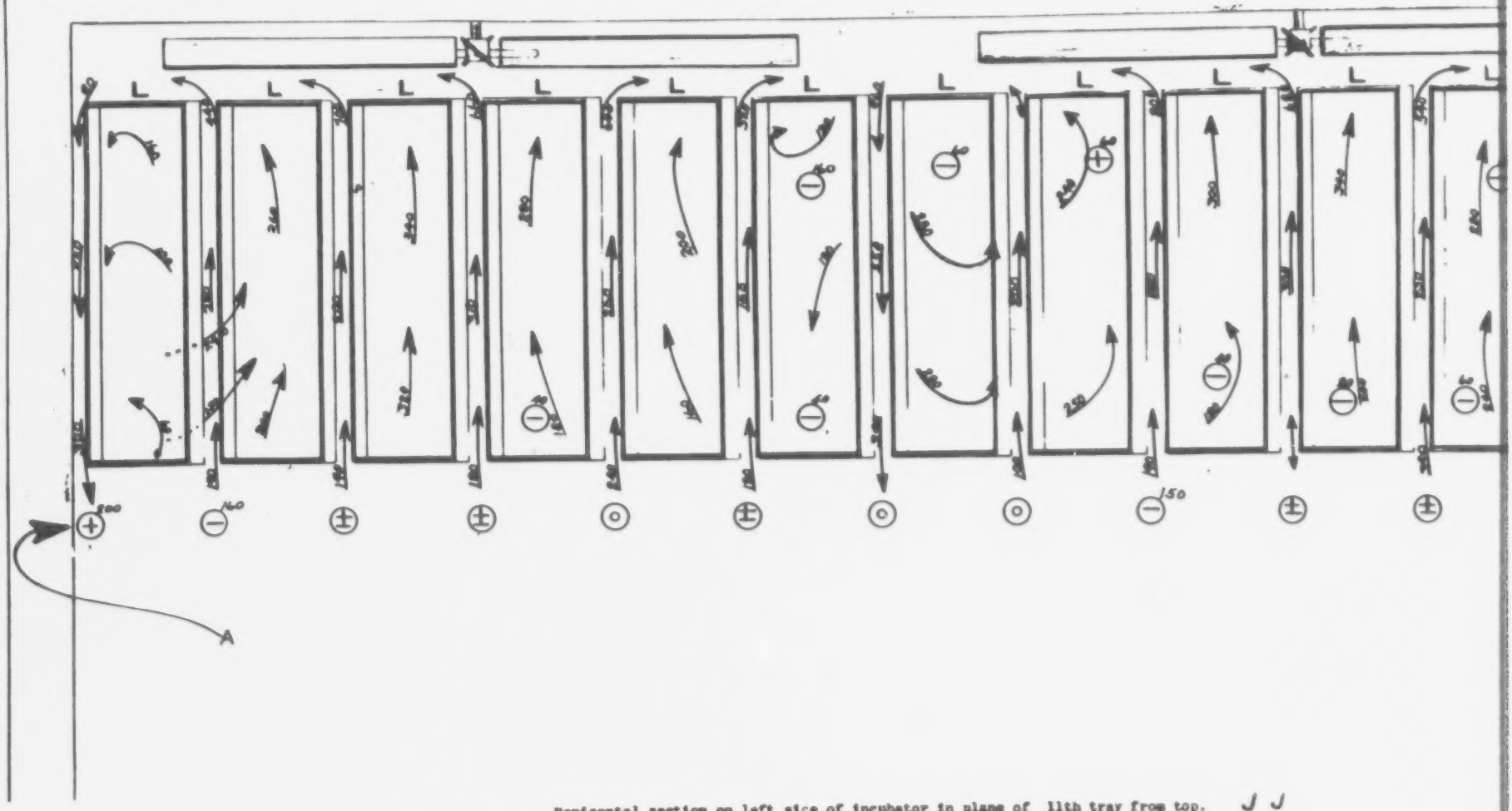
While collecting data for this diagram, trays were turned approximately 45 degrees from horizontal with left side down or with trays opposite to position shown in "Sectional view in plane of fans".

Readings between trays were taken with anemometers parallel to fans.

Arrows in trays show general direction and approximate speed of air currents passing through tray columns.

Fans were rotating counter clockwise 208-210 R. P. M.

Plfs. Ex. 12 JJ



Horizontal section on left side of incubator in plane of 11th tray from top. J J

⊕ 100 – Circles in trays give position and reading of anemometers when placed flat on bottom of tray.

⊕ – Plus reading indicates air moving downward through bottom of tray.

⊖ – Minus means air moves upward.

⊕⊖ – Plus or minus indicates anemometer does not run steadily in one direction when in this position.

⊙ – Zero means no movement.

A – Anemometer readings shown in this line were taken between tray columns at edge of corridor, holding anemometer parallel to floor of incubator.

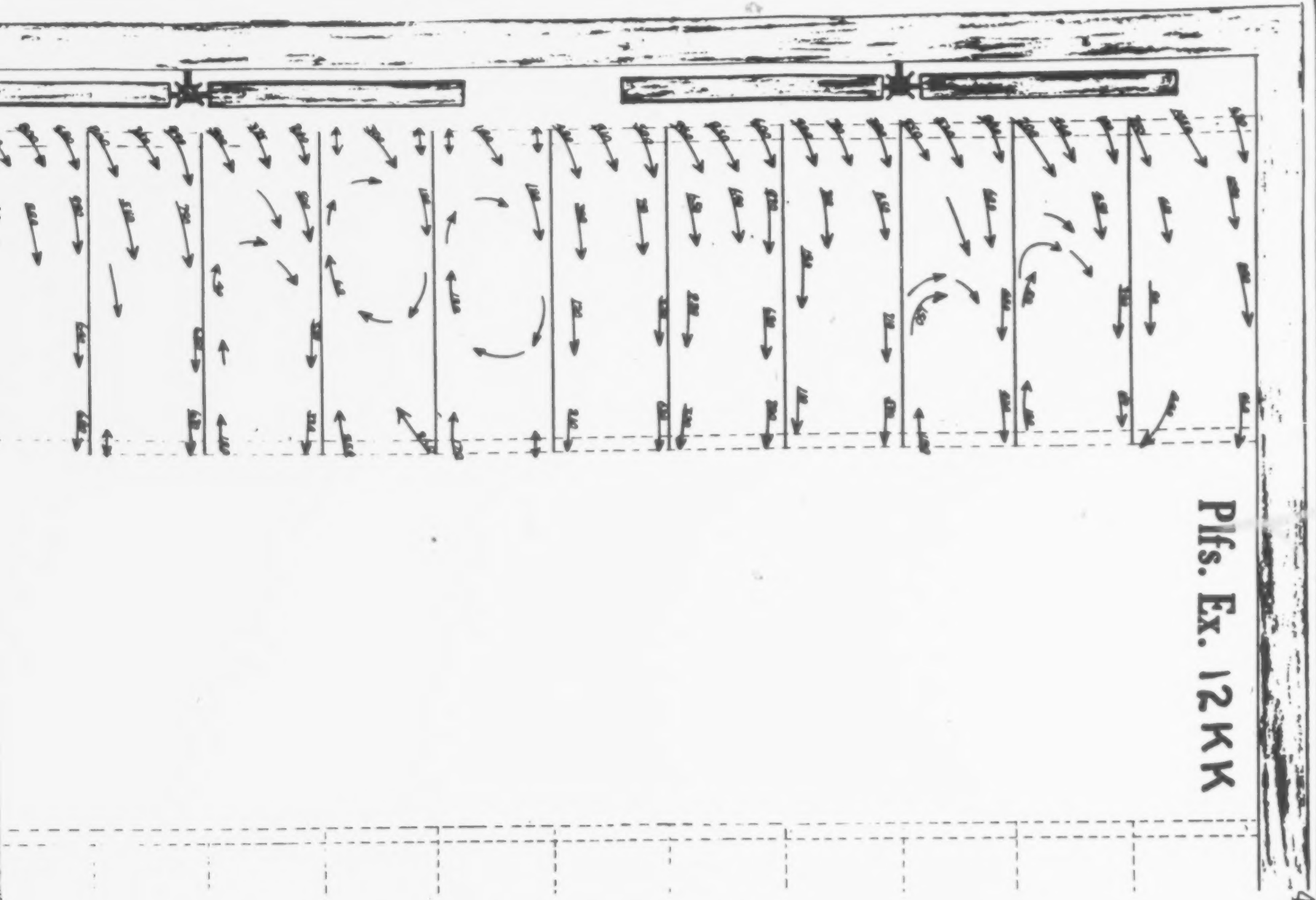
While collecting data for this diagram, trays were turned approximately 45 degrees from horizontal with left side down or with trays opposite to position shown in "Sectional view in plane of fans".

Readings between trays were taken with anemometers parallel to fans.

Arrows in trays show general direction and approximate speed of air currents passing through tray columns.

Fans were rotating counter clockwise 206-210 R. P. M.

SNOW-INCUBATOR



Pfs. Ex. 12 K K

Diagram of air currents on floor of incubator below bottom tray. K K

Arrows show general direction of air currents.
Numbers give approximate speed of currents as recorded by anemometer.

Fans were rotating counter clockwise 208-210 R.P.M.

SNOW-INCUBATOR

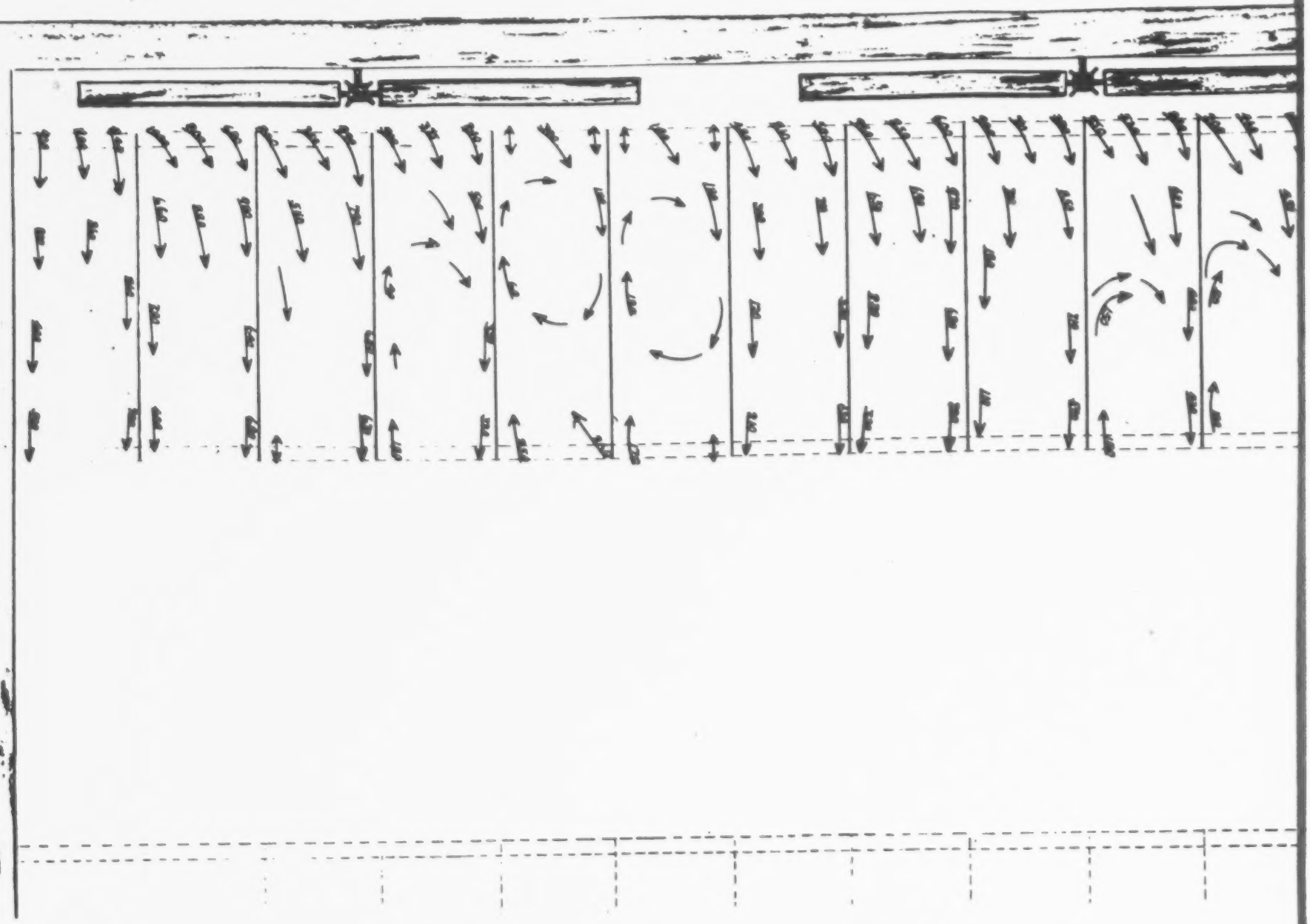
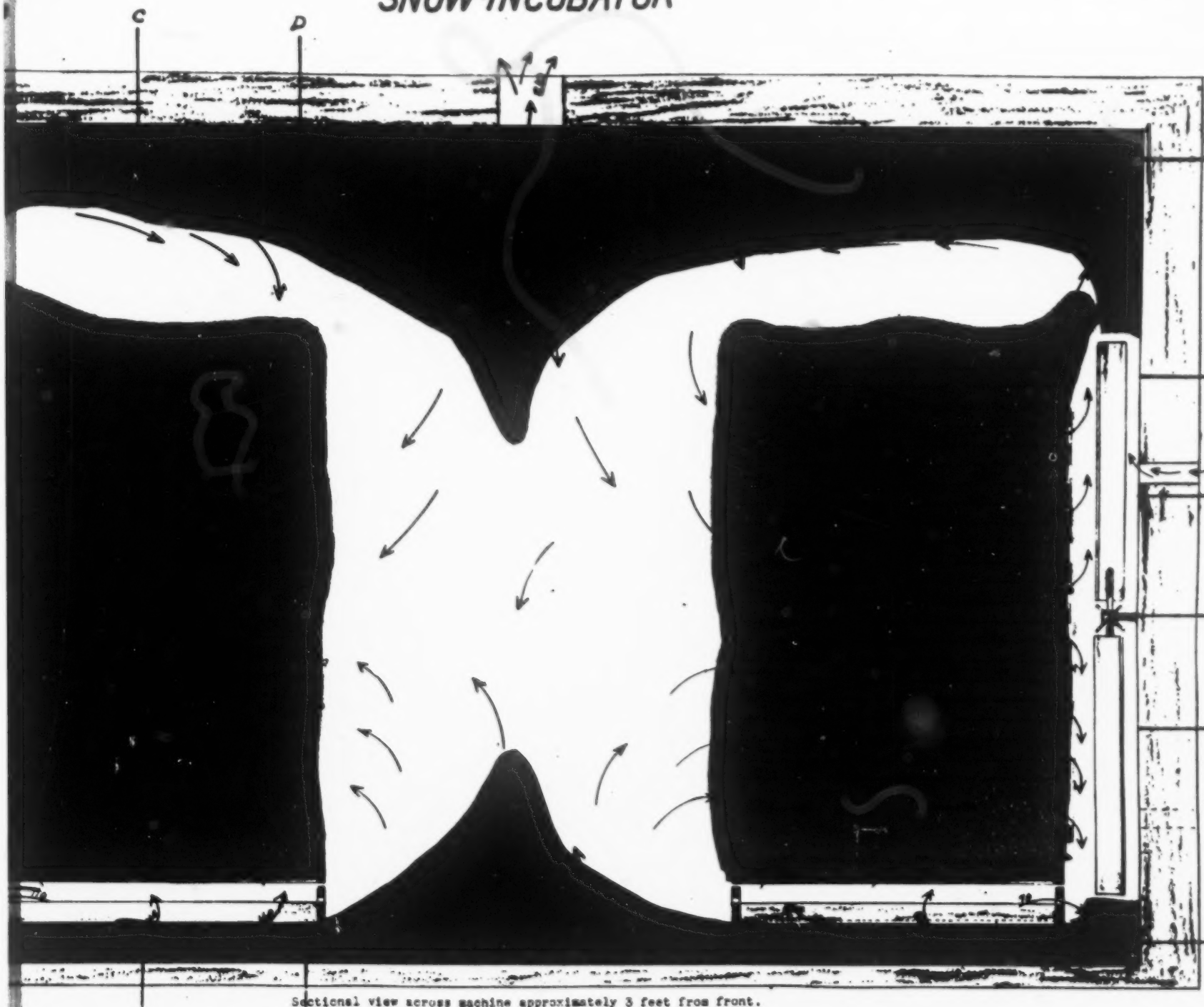


Diagram of air currents on floor of incubator below bottom tray. K K

Arrows show general direction of air currents.
Numbers give approximate speed of currents as recorded by anemometer.

Fans were rotating counter clockwise 208-210 R.P.M.

SNOW-INCUBATOR



Sectional view across machine approximately 3 feet from front.

Arrows show general direction of air currents. Numbers give approximate speed of currents as recorded by anemometer.

Readings in lower two trays were taken with the anemometers in the trays.

Fans were rotating counter clockwise 630-650 R.P.M.

← 200

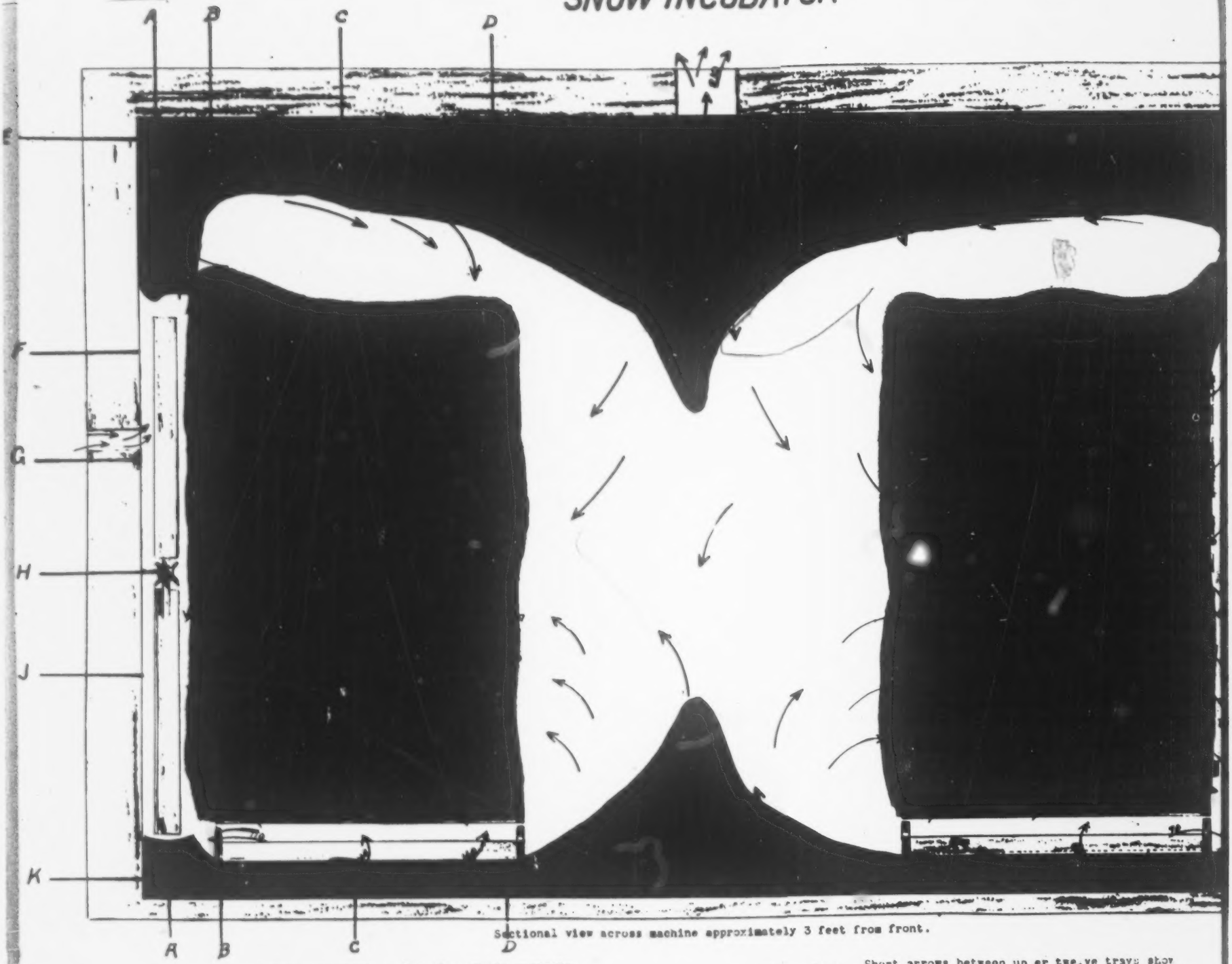
Short arrows between upper twelve trays show direction and approximate speed of air currents near center of trays. In these readings, the anemometer was placed in the trays in normal operating position.

← 310

Long arrows sweeping across sides of upper twelve trays show currents between tray columns.

Pltfs. Ex. 13

SNOW-INCUBATOR



Sectional view across machine approximately 3 feet from front.

Arrows show general direction of air currents. Numbers give approximate speed of currents as recorded by anemometer.

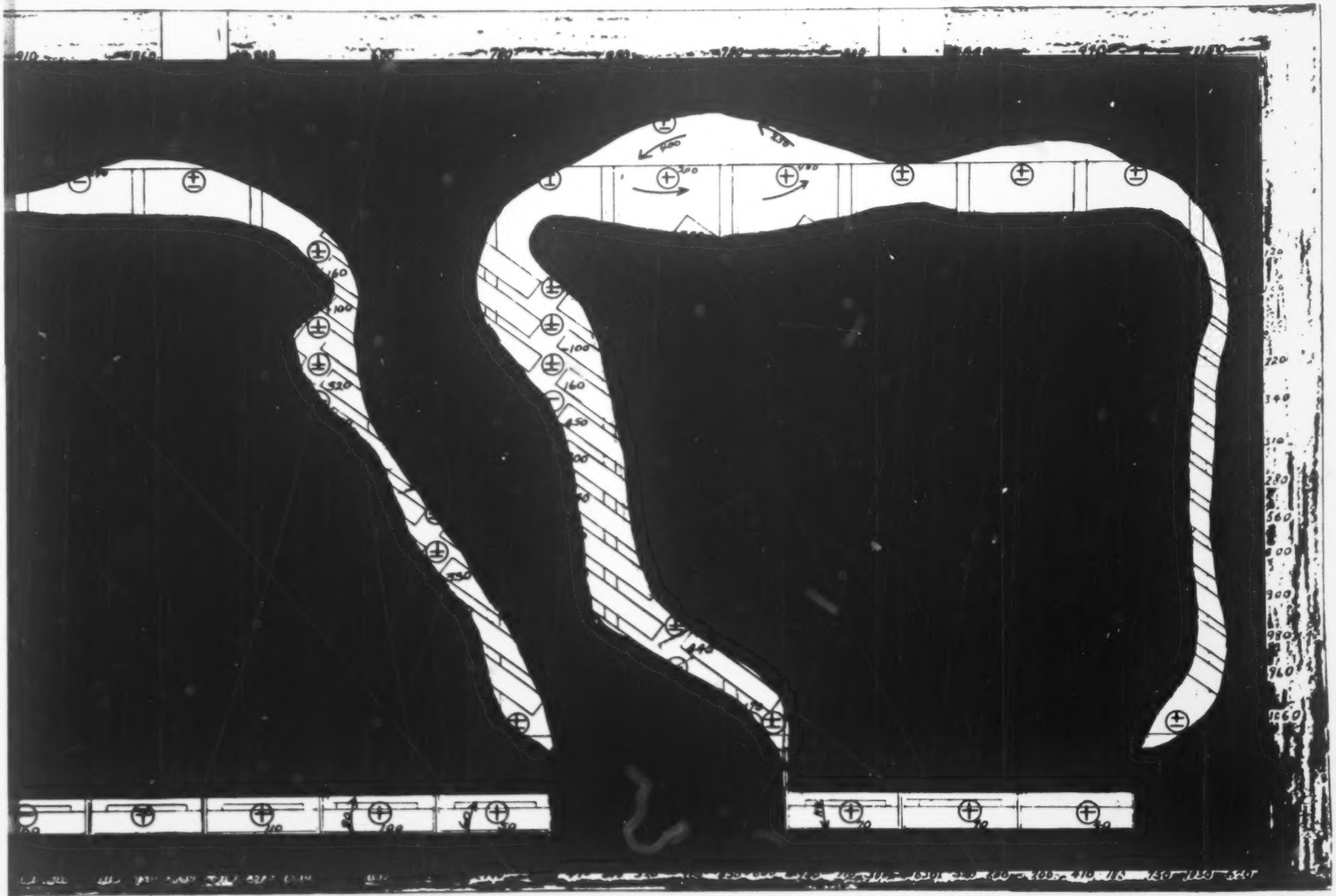
Readings in lower two trays were taken with the anemometers in the trays.

Fans were rotating counter clockwise 500-610 r.p.m.

200 — Short arrows between upper twelve trays show direction and approximate speed of air currents near center of trays. In these readings, the anemometer was placed in the trays in normal operating position.

710 — Long arrows sweeping across sides of upper twelve trays show currents between tray columns.

SNOW INCUBATOR



Sectional view in plane parallel to fans and approximately six inches in front of fans. *B*.

⊕ 100 − Shows position of anemometer, direction of air flow, and approximate speed of currents.

⊖ − Air flowing away from fan.

⊕ − Air flowing to the fan.

⊖ 100 − Approximate speed of air current in lineal feet per minute as recorded by anemometer.

⊕ − Anemometer does not run steadily in one direction when placed in this position.

← 100 Arrows show cross current to anemometer. The numbers give their approximate speed.

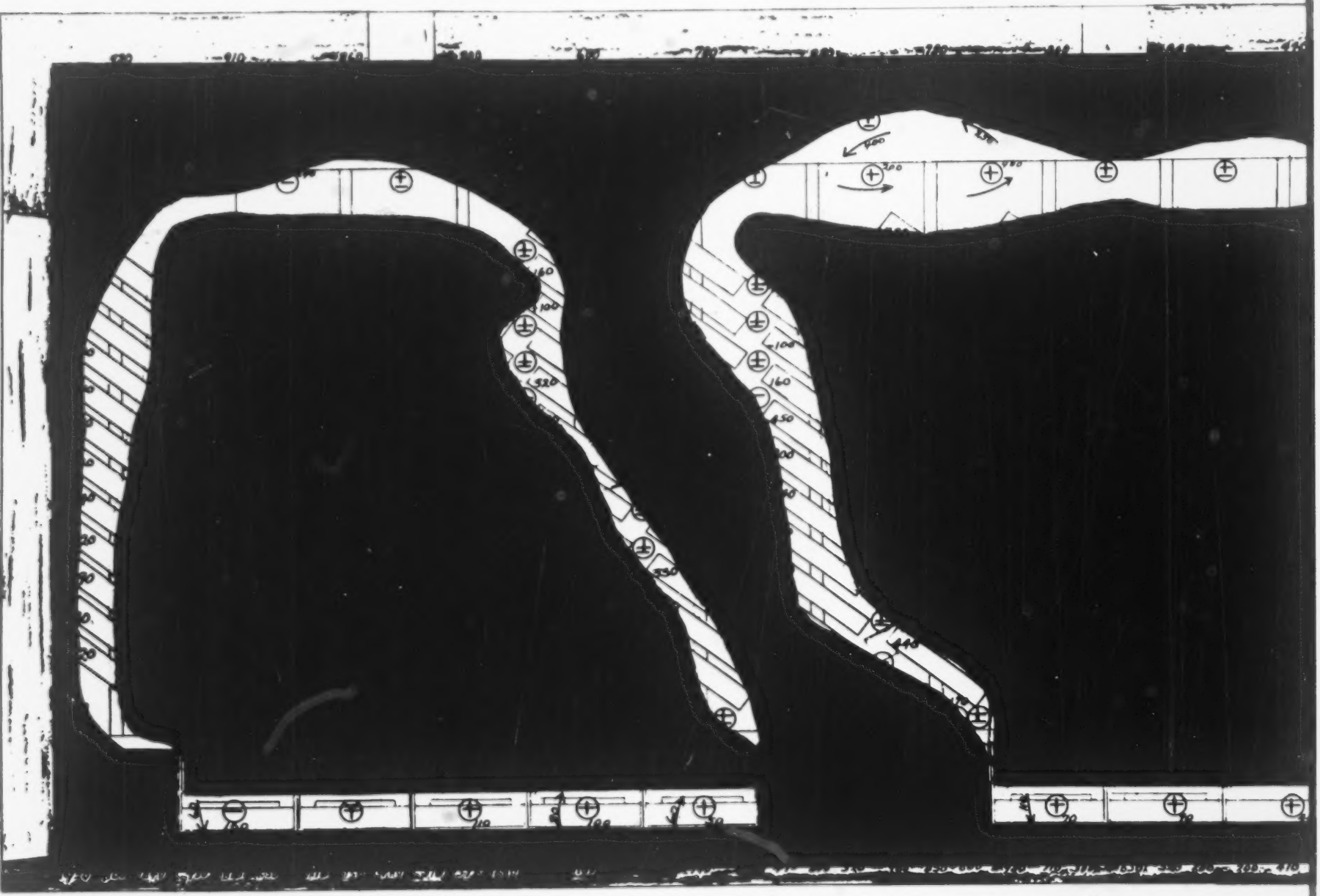
In this sectional view all readings were taken with the anemometers parallel to the fans with the exception of the twelve readings along the ceiling. These twelve were taken with the anemometer at right angles to the current. Readings at side of turning trays were taken approximately three inches from rear of the trays. Readings in hatching trays were taken four inches from rear of trays. All other readings were taken in the plane of the rear end of trays.

Fans were rotating counter clockwise 208-210 R.P.M.

Plfs. Ex. 13BB

497

SNOW INCUBATOR



Sectional view in plane parallel to fans and approximately six inches in front of fans. *B*.

⊕ 100 ⊖ – Shows position of anemometer, direction of air flow, and approximate speed of currents.

⊖ – Air flowing away from fan.

⊕ – Air flowing to the fan.

⊖ 100 – Approximate speed of air current in lineal feet per minute as recorded by anemometer.

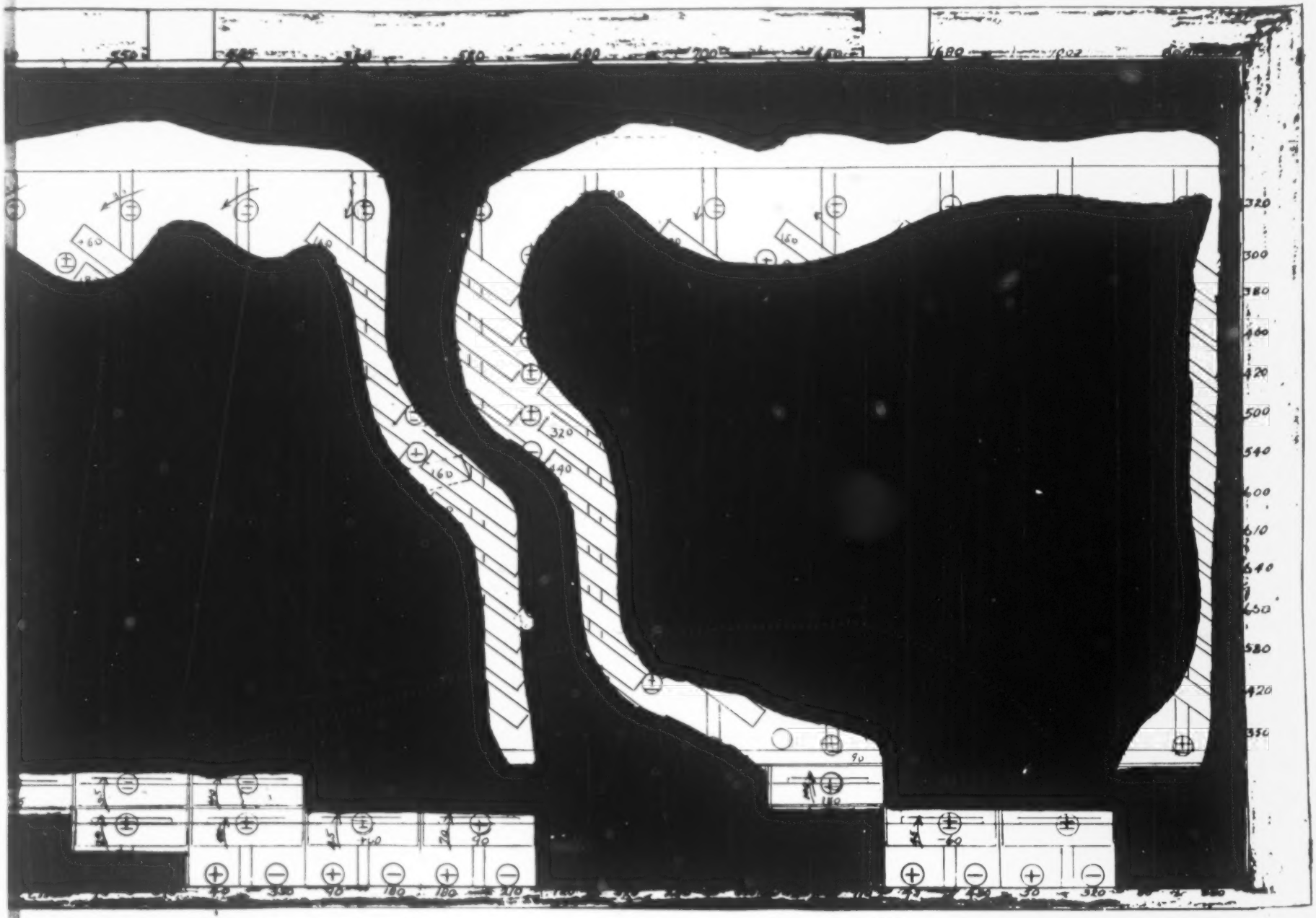
⊕ ⊖ – Anemometer does not run steadily in one direction when placed in this position.

← 100 Arrows show cross current to anemometer. The numbers give their approximate speed.

In this sectional view all readings were taken with the anemometers parallel to the fans with the exception of the twelve readings along the ceiling. These twelve were taken with the anemometer at right angles to the current. Readings at side of turning trays were taken approximately three inches from rear of the trays. Readings in hatching trays were taken four inches from rear of trays. All other readings were taken in the plane of the rear end of trays.

Fans were rotating counter clockwise 208-210 R.P.M.

SNOW INCUBATOR



Sectional view in plane parallel to fans and midway between front and rear of the trays. C C

⊕ 100 – Shows position of anemometer, direction of air flow, and approximate speed of air currents.

⊖ – Air flowing away from fan.

⊕ – Air flowing to the fan.

⊖ 100 – Approximate speed of air current in lineal feet per minute as recorded by anemometer.

⊕ – Anemometer does not run steadily in one direction when placed in this position.

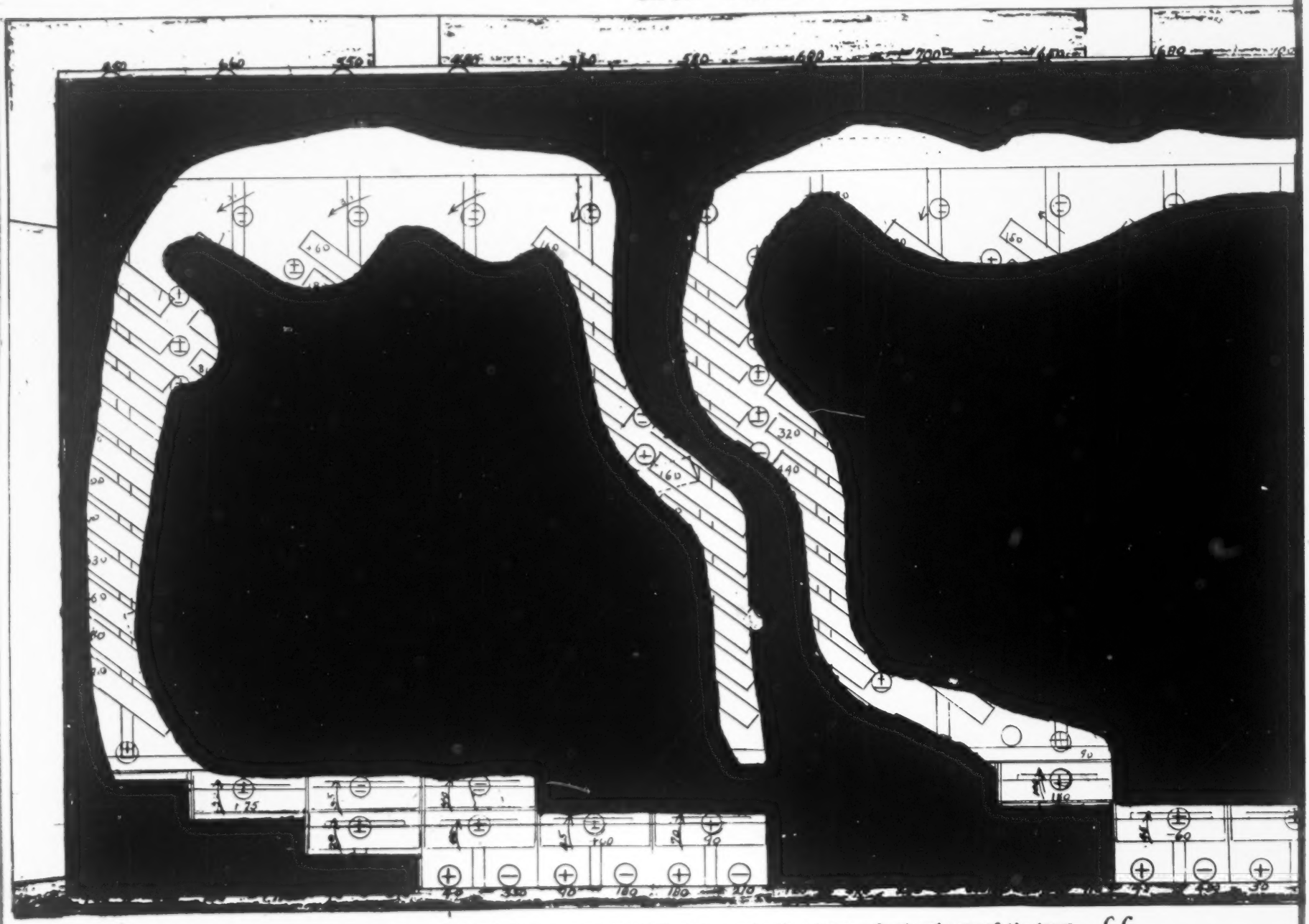
← 100 Arrows show cross current to anemometer. The numbers give their approximate speed.

In this sectional view all readings were taken midway between the front and rear of the trays and with the anemometer parallel to the fans with the exception of the twelve along the ceiling. These twelve were taken with the anemometer at right angles to the current.

Fans were rotating counter clockwise 208-210 R.P.M.

Pfs. Ex. 13CC

SNOW INCUBATOR



Sectional view in plane parallel to fans and midway between front and rear of the trays. C C

⊕ 100 – Shows position of anemometer, direction of air flow, and approximate speed of air currents.

⊖ – Air flowing away from fan.

⊕ – Air flowing to the fan.

⊖ 100 – Approximate speed of air current in lineal feet per minute as recorded by anemometer.

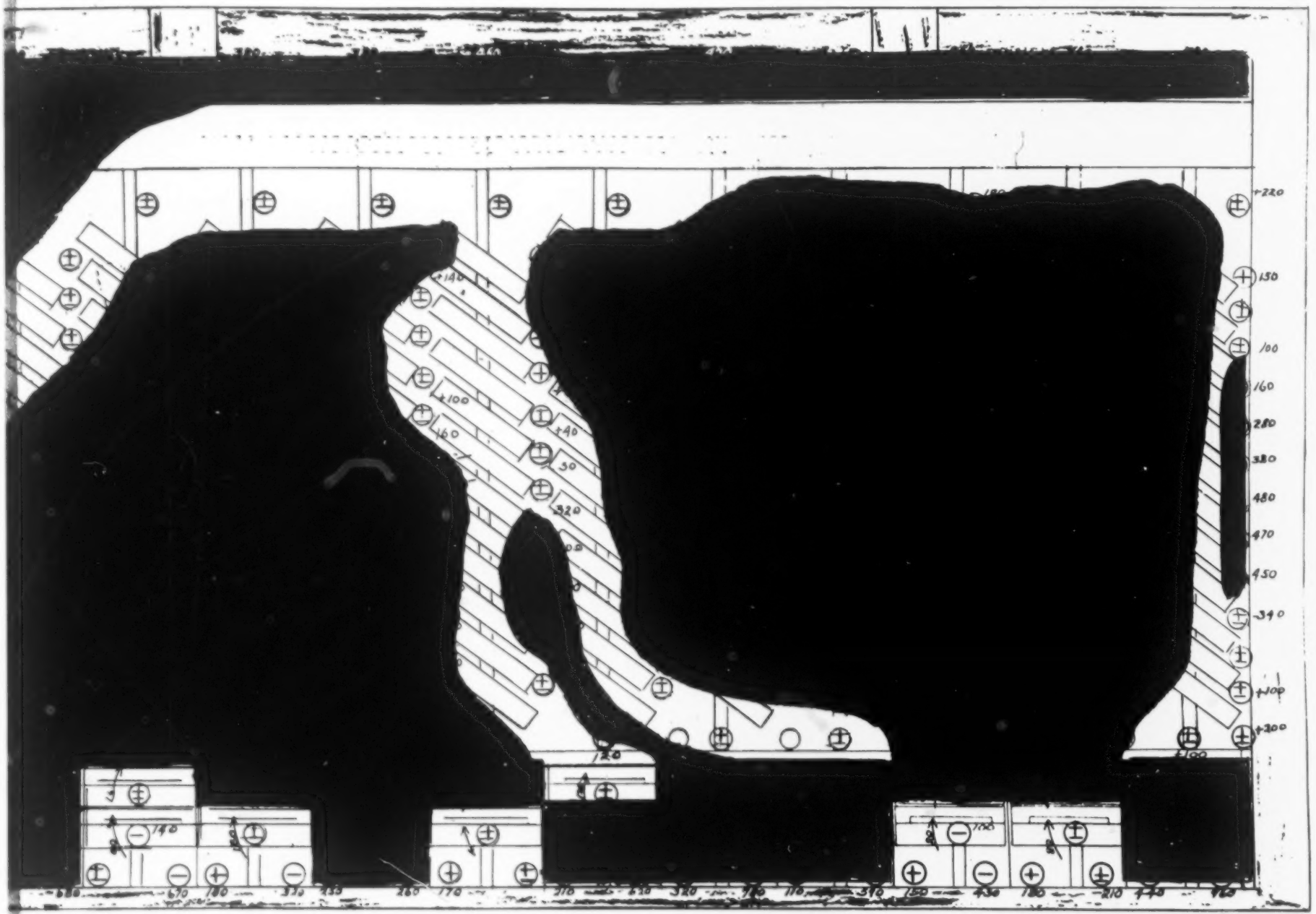
⊕ – Anemometer does not run steadily in one direction when placed in this position.

← 100 Arrows show cross current to anemometer. The numbers give their approximate speed.

In this sectional view all readings were taken midway between the front and rear of the trays and with the anemometer parallel to the fans with the exception of the twelve along the ceiling. These twelve were taken with the anemometer at right angles to the current.

Fans were rotating counter clockwise 208-210 R.P.M.

SNOW INCUBATOR



Sectional view in plane parallel t. f* and near front of trays. D D

⊕ 100 — Shows position of anemometer, direction of air flow, and approximate speed of air currents.

⊖ — Air flowing away from fan.

⊕ — Air flowing to the fan.

⊖ 100 — Approximate speed of air current in lineal feet per minute as recorded by anemometer.

⊕ — Anemometer does not run steadily in one direction when placed in this position.

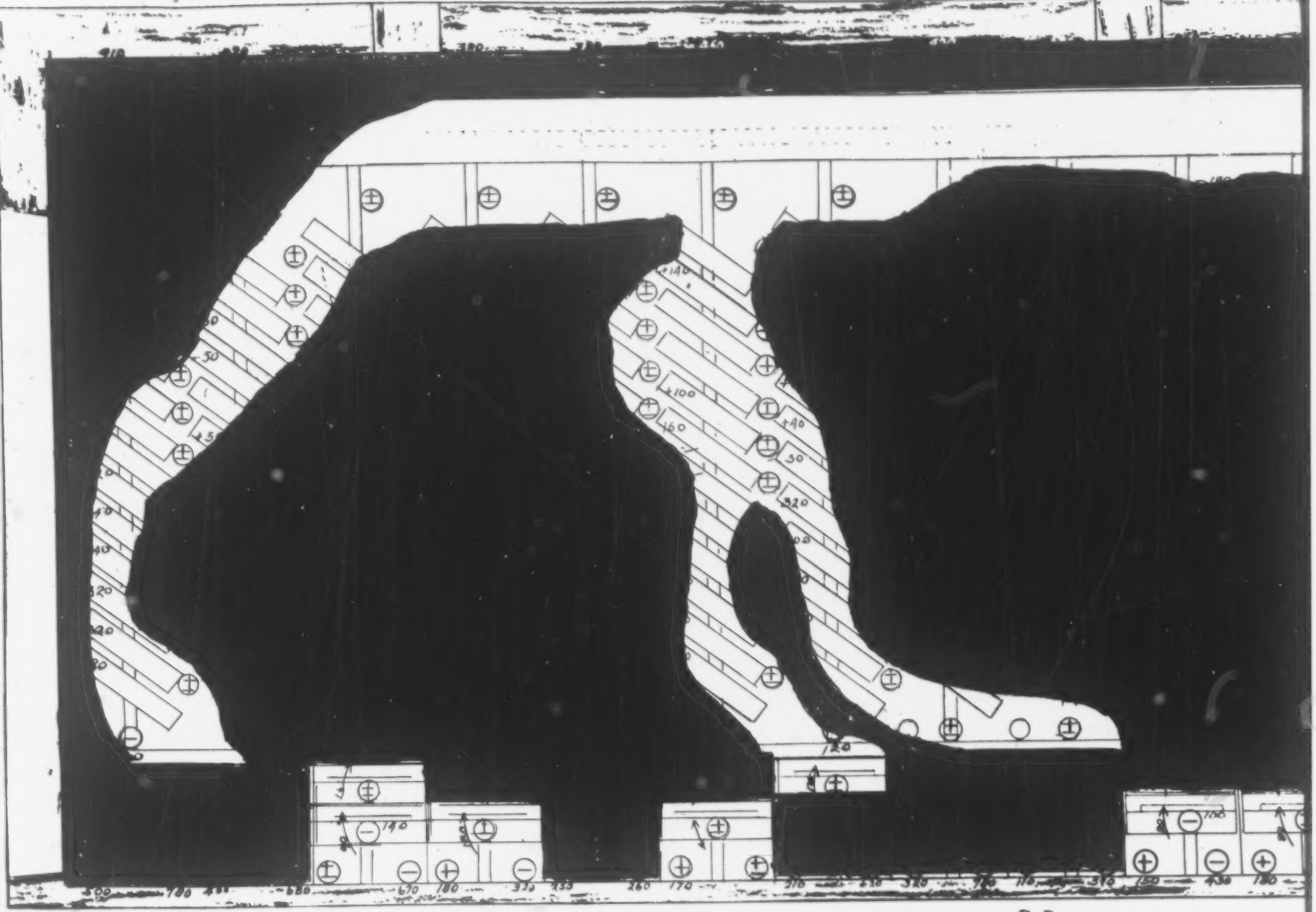
← 100 Arrows show cross current to anemometer. The numbers give their approximate speed.

In this sectional view all readings were taken with the anemometer parallel to the fans. Readings at the side of the turning trays were taken approximately three inches from front of trays. Readings in the hatching racks were taken four inches from front of trays. All other readings were taken in the plan of the front of the trays.

Fans were rotating counter clockwise 208-210 R.P.M.

Plfs. Ex. 13DD

501



Sectional view in plane parallel to f[illegible] and near front of trays. D D

⊕ 100 − Shows position of anemometer, direction of air flow, and approximate speed of air currents.

⊖ – Air flowing away from fan.

⊕ – Air flowing to the fan.

⊖ 100 − Approximate speed of air current in lineal feet per minute as recorded by anemometer.

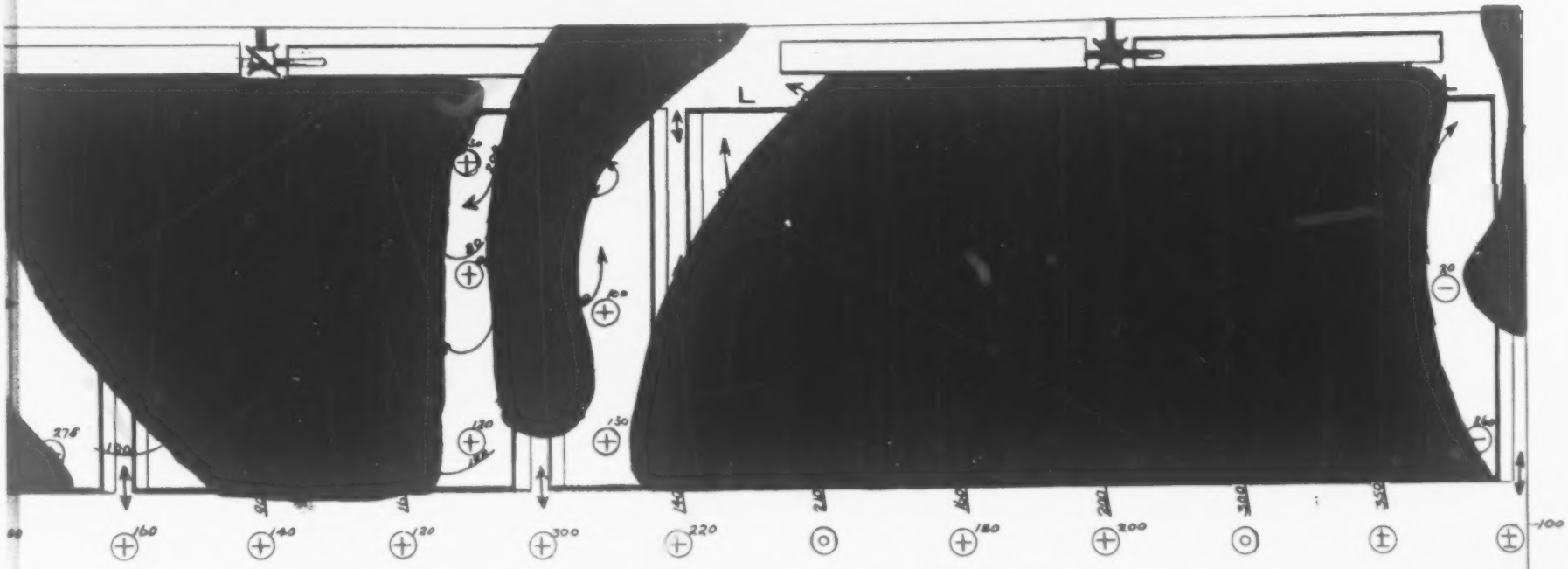
⊕ – Anemometer does not run steadily in one direction when placed in this position.

← 100 Arrows show cross current to anemometer. The numbers give their approximate speed.

In this sectional view all readings were taken with the anemometer parallel to the fans. Readings at the side of the turning trays were taken approximately three inches from front of trays. Readings in the hatching racks were taken four inches from front of trays. All other readings were taken in the plan of the front of the trays.

Fans were rotating counter clockwise 208-210 R.P.M.

SNOW-INCUBATOR



Horizontal section on left side of incubator in plane of 2nd tray from top. F F

⊕ 100 – Circles in trays give position and reading of anemometers when placed flat on bottom of tray.

⊕ – Plus reading indicates air moving downward through bottom of tray.

⊖ – Minus means air moves upward.

⊕ – Plus or minus indicates anemometer does not run steadily in one direction when in this position.

⊙ – Zero means no movement.

A – Anemometer readings shown in this line were taken between tray columns at edge of corridor, holding anemometer parallel to floor of incubator.

While collecting data for this diagram, trays were turned approximately 45 degrees from horizontal with left side down or with trays opposite to position shown in "Sectional view in plane of fans".

Readings between trays were taken with anemometers parallel to fans.

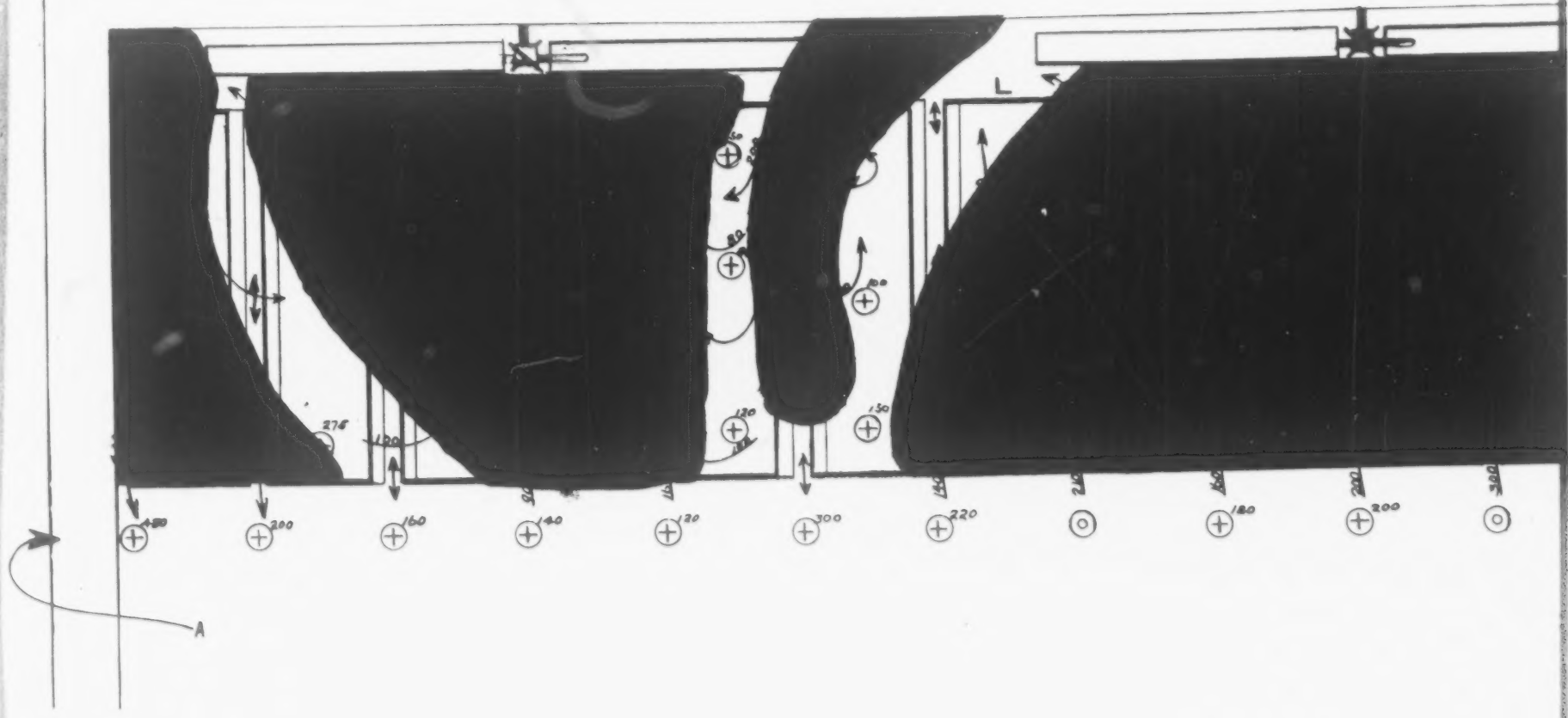
Arrows in trays show general direction and approximate speed of air currents passing through tray columns.

Fans were rotating counter clockwise 208-210 R. P. M.

Plfs. Ex. 13FF

503

SNOW-INCUBATOR



Horizontal section on left side of incubator in plane of 2nd tray from top. F F

⊕ 100 – Circles in trays give position and reading of anemometers when placed flat on bottom of tray.

⊕ – Plus reading indicates air moving downward through bottom of tray.

⊖ – Minus means air moves upward.

⊕ – Plus or minus indicates anemometer does not run steadily in one direction when in this position.

⊙ – Zero means no movement.

A – Anemometer readings shown in this line were taken between tray columns at edge of corridor, reading anemometer parallel to floor of incubator.

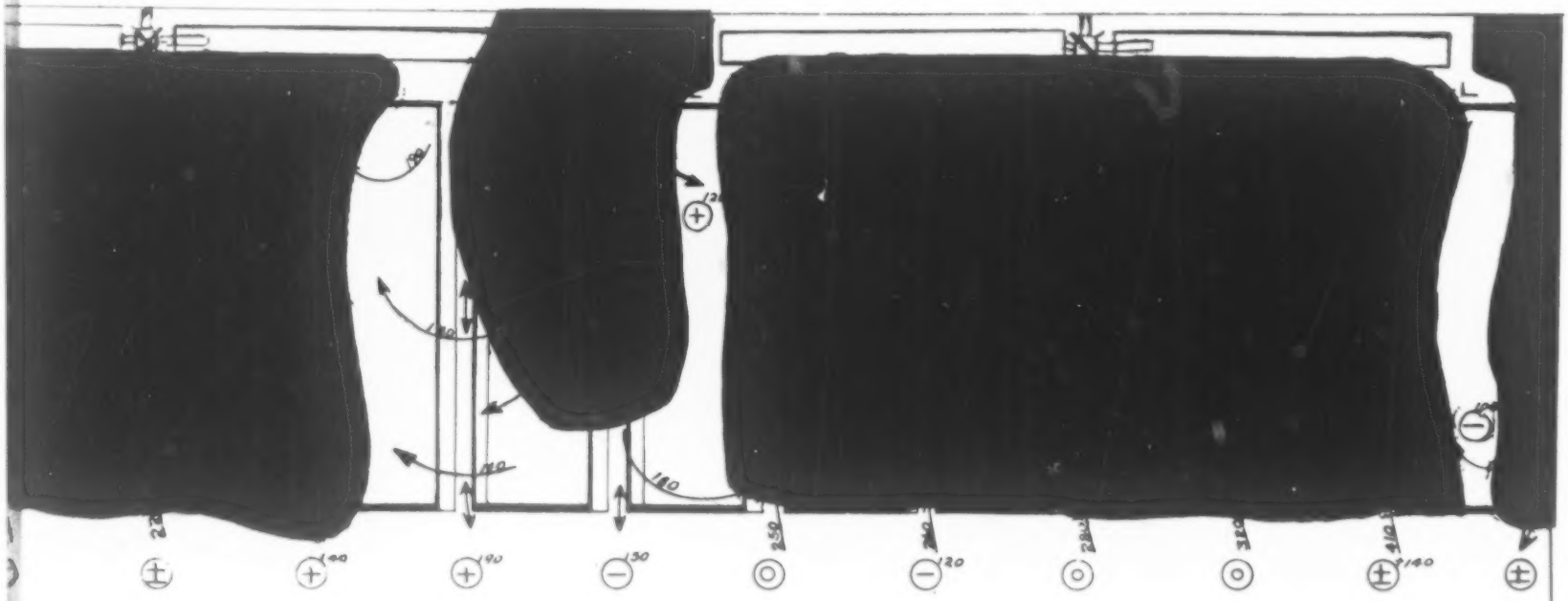
While collecting data for this diagram, trays were turned approximately 45 degrees from horizontal with left side down or with trays opposite to position shown in "Sectional view in plane of fans".

Readings between trays were taken with anemometers parallel to fans.

Arrows in trays show general direction and approximate speed of air currents passing through tray columns.

Fans were rotating counter clockwise 205-210 R. P. M.

SNOW-INCUBATOR



Horizontal section on left side of incubator in plane of 5th tray from top. G G

+100 – Circles in trays give position of reading of anemometers when placed flat on bottom of tray.

\+ – Plus reading indicates air moving downward through bottom of tray.

− – Minus means air moves upward.

± – Plus or minus indicates anemometer does not run steadily in one direction when in this position.

⊙ – Zero means no movement.

^ – Anemometer readings shown in this line were taken between trays columns at edge of corridor, holding anemometer parallel to floor of incubator.

While collecting data for this diagram, trays were turned approximately 45 degrees from horizontal with left side down or with trays opposite to position shown in "Sectional view in plane of fans".

Readings between trays were taken with anemometers parallel to fans.

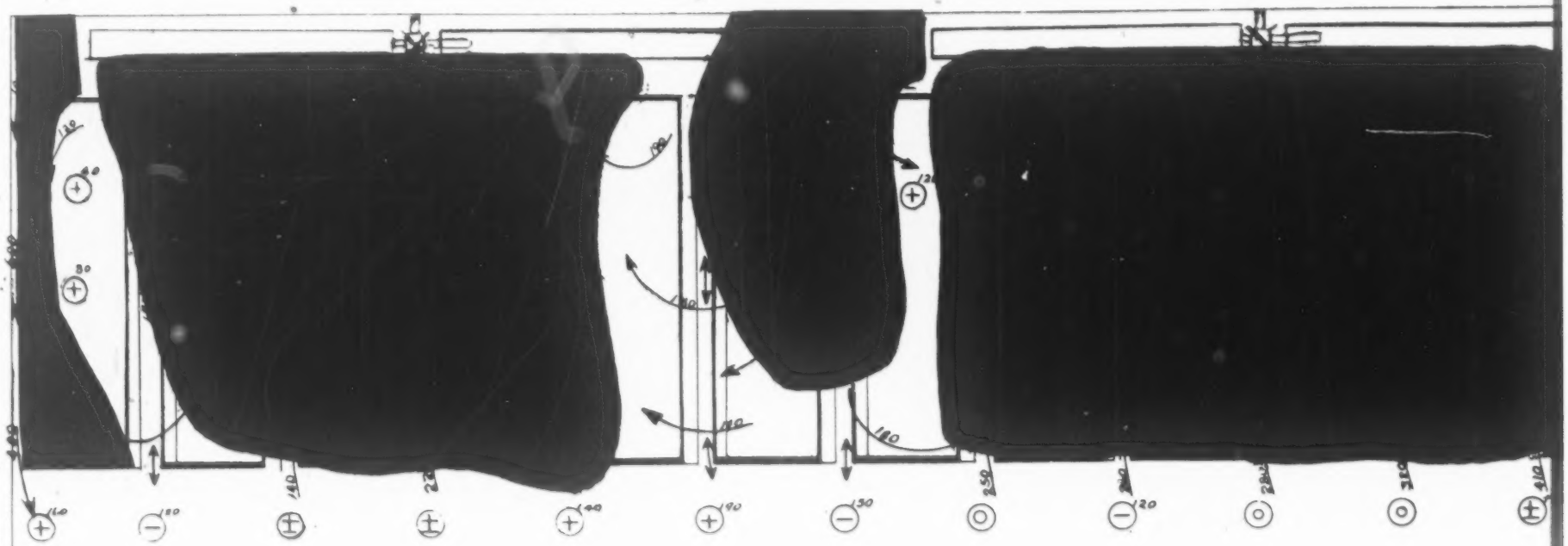
Arrows in trays show general direction and approximate speed of air currents passing through tray columns.

Fans were rotating counter clockwise 230-240 R. P. M.

Plfs. Ex. 13 GG

505

SNOW-INCUBATOR



A

Horizontal section on left side of incubator in plane of 5th tray from top. G G

⊕ 100 − Circles in trays give position of reading of anemometers when placed flat on bottom of tray.

⊕ − Plus reading indicates air moving downward through bottom of tray.

⊖ − Minus means air moves upward.

⊜ − Plus or minus indicates anemometer does not run steadily in one direction when in this position.

⊙ − Zero means no movement.

A − Anemometer readings shown in this line were taken between trays columns at edge of corridor, holding anemometer parallel to floor of incubator.

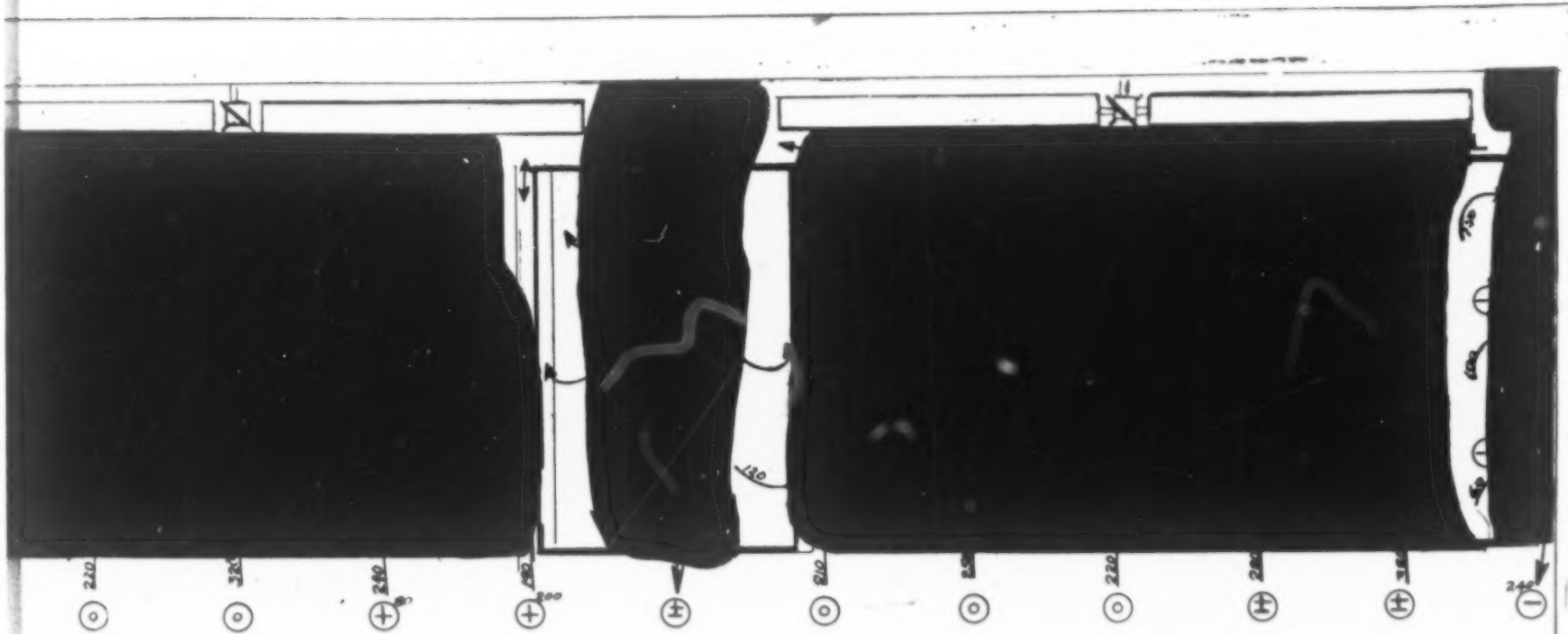
While collecting data for this diagram, trays were turned approximately 45 degrees from horizontal with left side down or with trays opposite to position shown in "Sectional view in plane of fans".

Readings between trays were taken with anemometers parallel to fans.

Arrows in trays show general direction and approximate speed of air currents passing through tray columns.

Fans were rotating counter clockwise 208-210 R. P. M.

SNOW-INCUBATOR



Horizontal section on left side of incubator in plane of 6th tray from top. H H

⊕ 100 / − Circles in trays give position and reading of anemometers when placed flat on bottom of tray.

⊕ – Plus reading indicates air moving downward through bottom of tray.

⊖ – Minus means air moves upward.

⊛ – Plus or minus indicates anemometer does not run steadily in one direction when in this position.

⊙ – Zero means no movement.

A – Anemometer readings shown in this line were taken between tray columns at edge of corridor, holding anemometer parallel to floor of incubator.

While collecting data for this diagram, trays were turned approximately 45 degrees from horizontal with left side down or with trays opposite to position shown in "Sectional view in plane of fans".

Readings between trays were taken with anemometers parallel to fans.

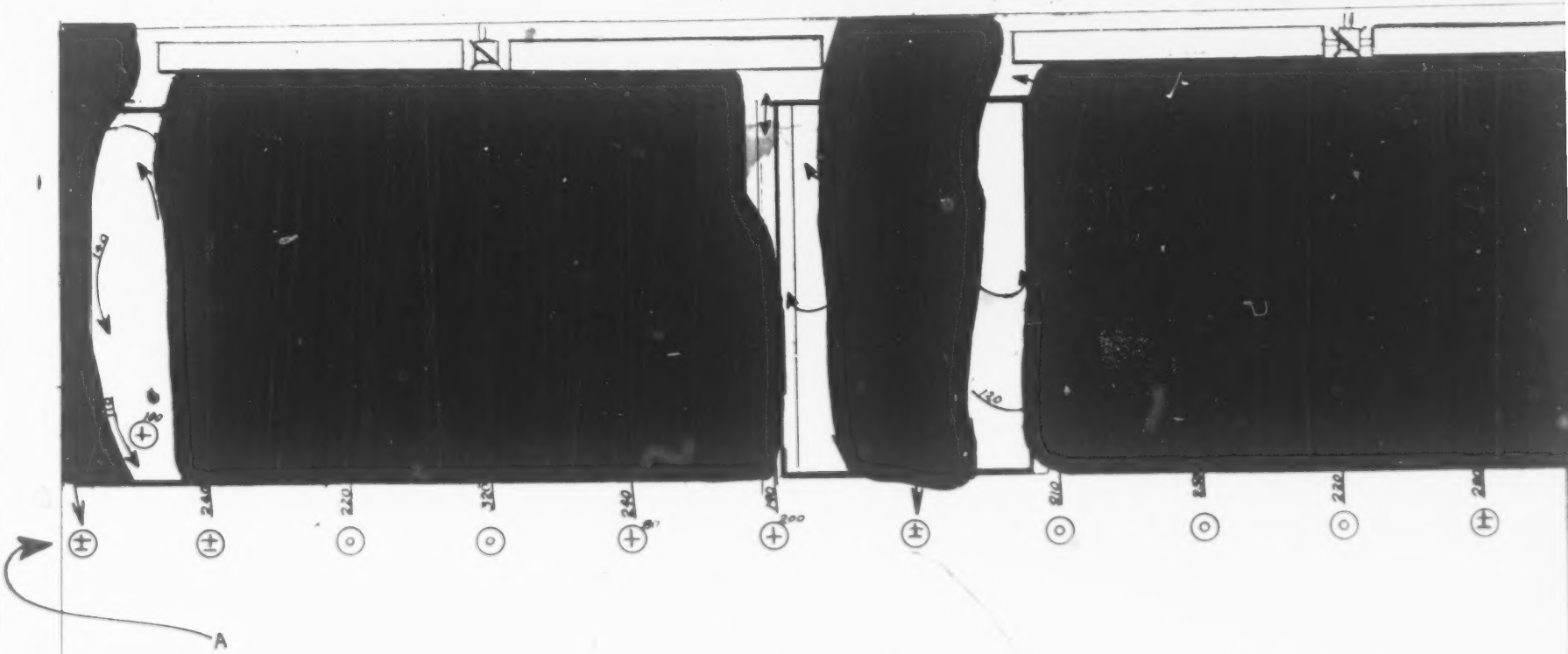
Arrows in trays show general direction and approximate speed of air currents passing through tray columns.

Fans were rotating counter clockwise 208-210 R. P. M.

Pfs. Ex. 13HH

507

SNOW-INCUBATOR



Horizontal section on left side of incubator in plane of 8th. tray from top. H H

⊕ 100 ⊖ – Circles in trays give position and reading of anemometers when placed flat on bottom of tray.

⊕ – Plus reading indicates air moving downward through bottom of tray.

⊖ – Minus means air moves upward.

⊕⊖ – Plus or minus indicates anemometer does not run steadily in one direction when in this position.

⊙ – Zero means no movement.

A – Anemometer readings shown in this line were taken between tray columns at edge of corridor, holding anemometer parallel to floor of incubator.

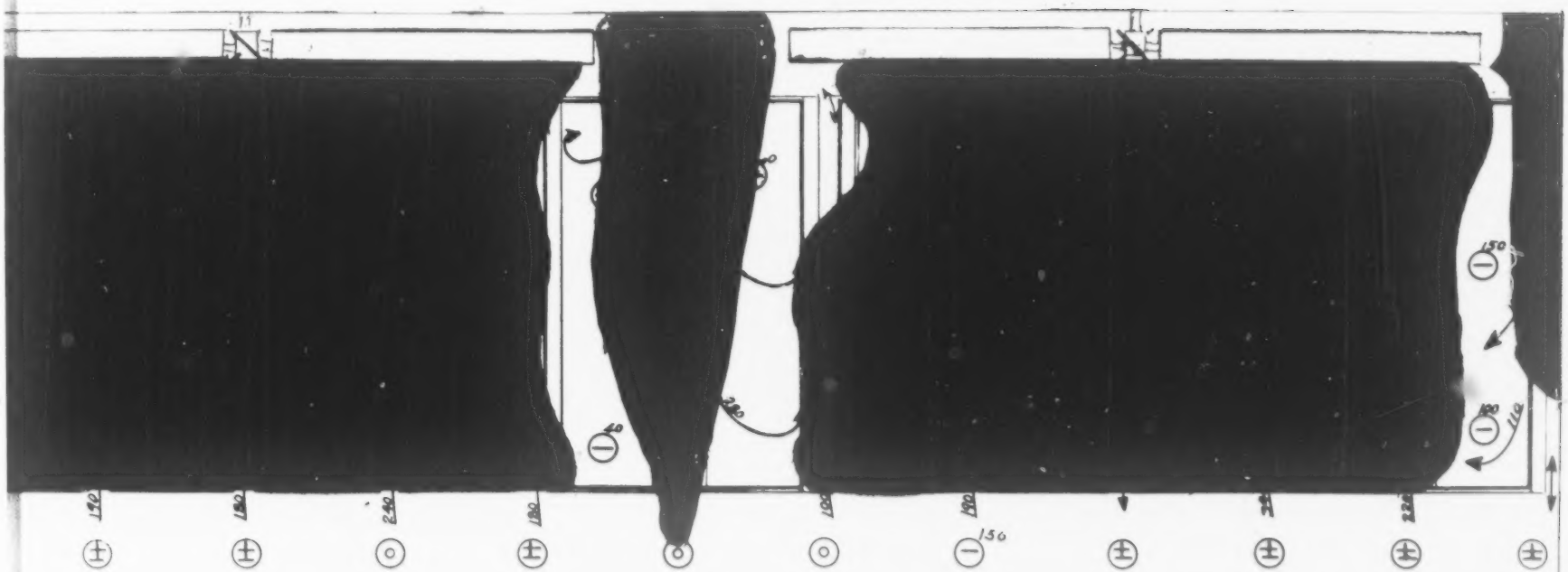
While collecting data for this diagram, trays were turned approximately 45 degrees from horizontal with left side down or with trays opposite to position shown in "Sectional view in plane of fans".

Readings between trays were taken with anemometers parallel to fans.

Arrows in trays show general direction and approximate speed of air currents passing through tray columns.

Fans were rotating counter clockwise 208-210 R. P. M.

SNOW-INCUBATOR



Horizontal section on left side of incubator in plane of 11th tray from top. J J

⊕ 100 −	Circles in trays give position and reading of anemometers when placed flat on bottom of tray.
⊕ −	Plus reading indicates air moving downward through bottom of tray.
⊖ −	Minus means air moves upward.
± −	Plus or minus indicates anemometer does not run steadily in one direction when in this position.
⊙ −	Zero means no movement.
A −	Anemometer readings shown in this line were taken between tray columns at edge of corridor, holding anemometer parallel to floor of incubator.

While collecting data for this diagram, trays were turned approximately 45 degrees from horizontal with left side down or with trays opposite to position shown in "Sectional view in plane of fans".

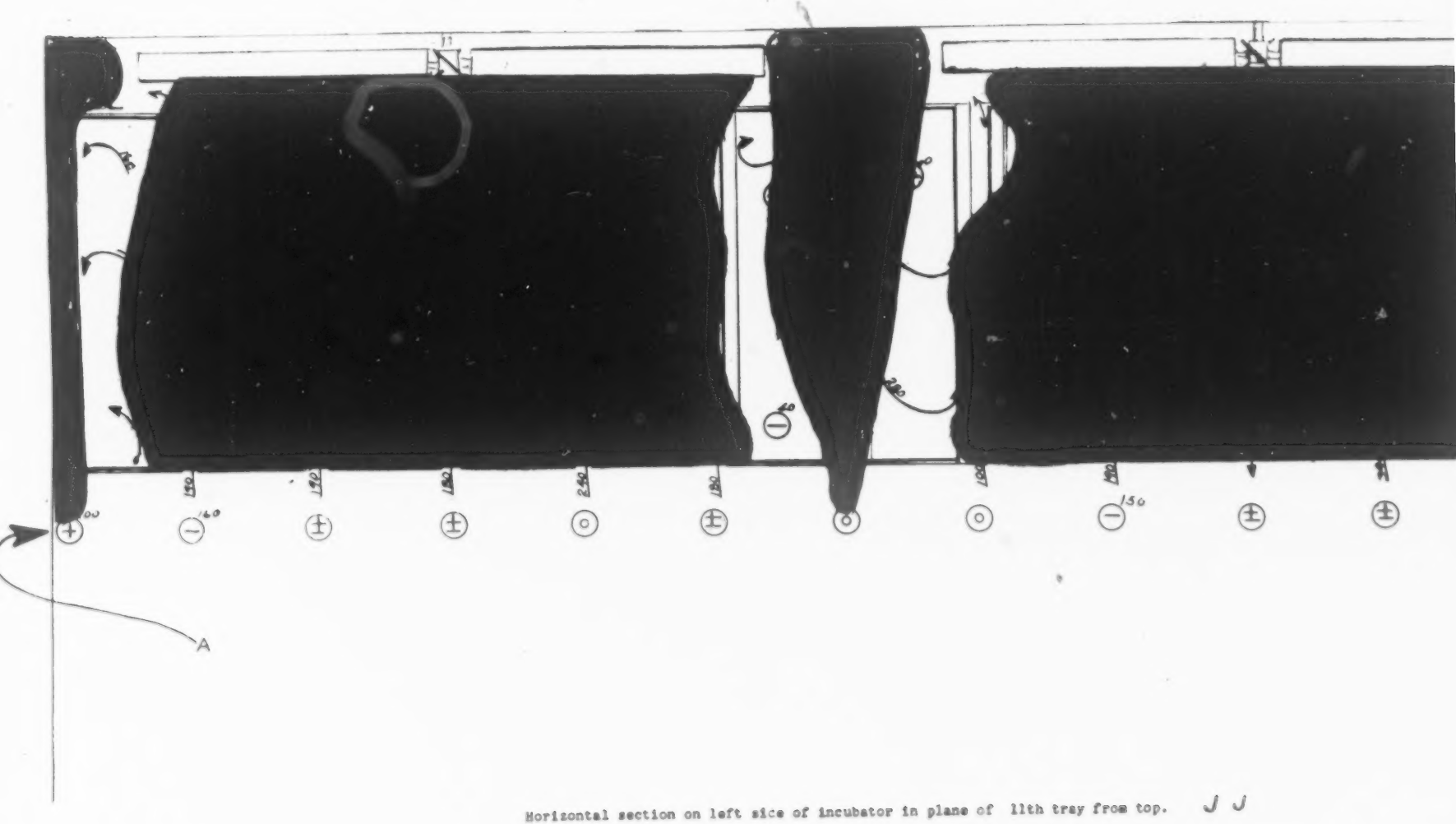
Readings between trays were taken with anemometers parallel to fans.

Arrows in trays show general direction and approximate speed of air currents passing through tray columns.

Fans were rotating counter clockwise 208-210 R. P. M.

Plfs. Ex. 13 JJ

SNOW-INCUBATOR



Horizontal section on left side of incubator in plane of 11th tray from top. J J

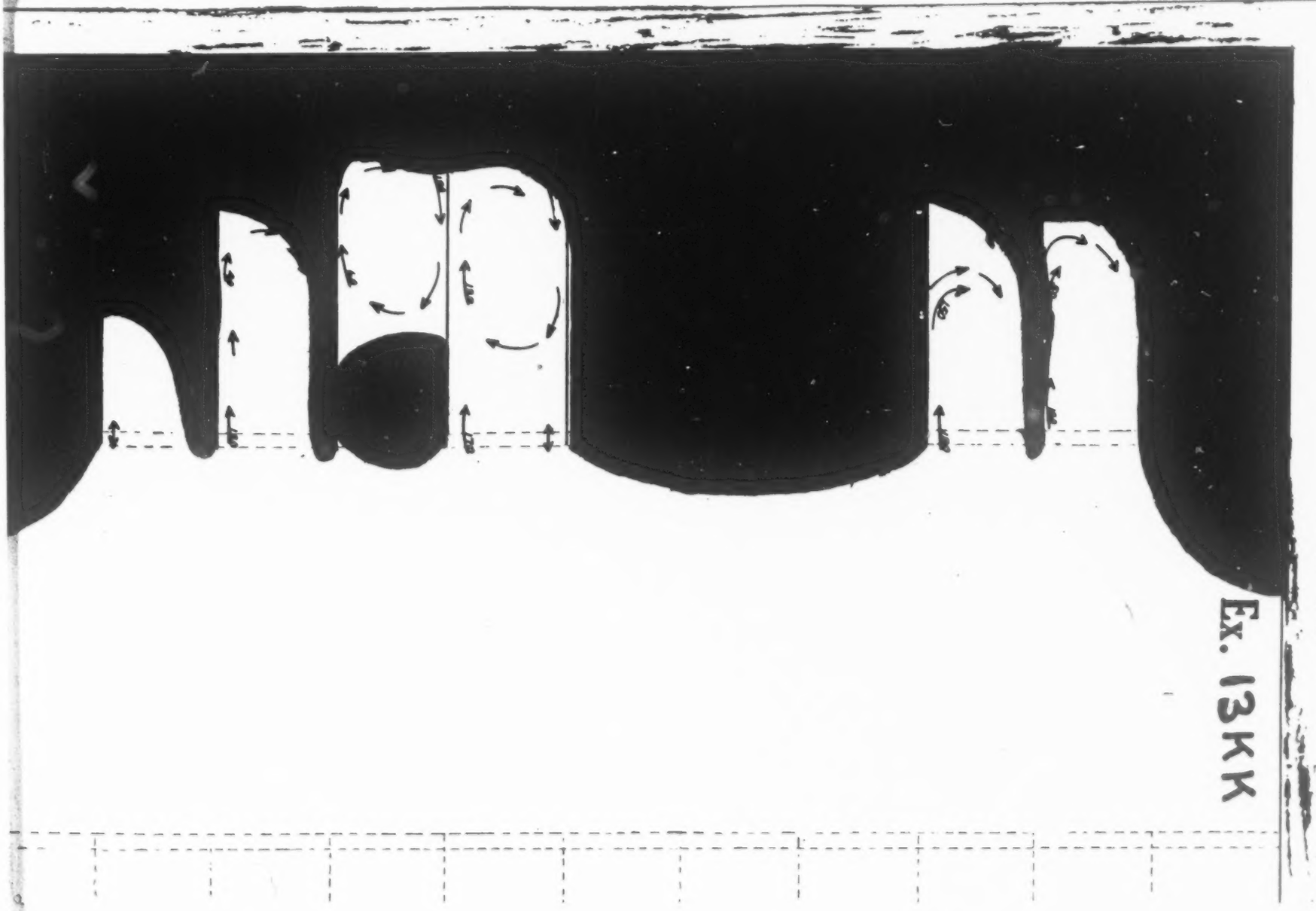
⊕ 100 −	Circles in trays give position and reading of anemometers when placed flat on bottom of tray.
⊕ −	Plus reading indicates air moving downward through bottom of tray.
⊖ −	Minus means air moves upward.
± −	Plus or minus indicates anemometer does not run steadily in one direction when in this position.
⊙ −	Zero means no movement.
A −	Anemometer readings shown in this line were taken between tray columns at edge of corridor, holding anemometer parallel to floor of incubator.

While collecting data for this diagram, trays were turned approximately 45 degrees from horizontal with left side down or with trays opposite to position shown in "Sectional view in plane of fans".

Readings between trays were taken with anemometers parallel to fans.

Arrows in trays show general direction and approximate speed of air currents passing through tray columns.

Fans were rotating counter clockwise 200-210 R. P. M.



Ex. 13KK

511

Diagram of air currents on floor of incubator below bottom tray. K K

Arrows show general direction of air currents.
Numbers give approximate speed of currents as recorded by anemometer.

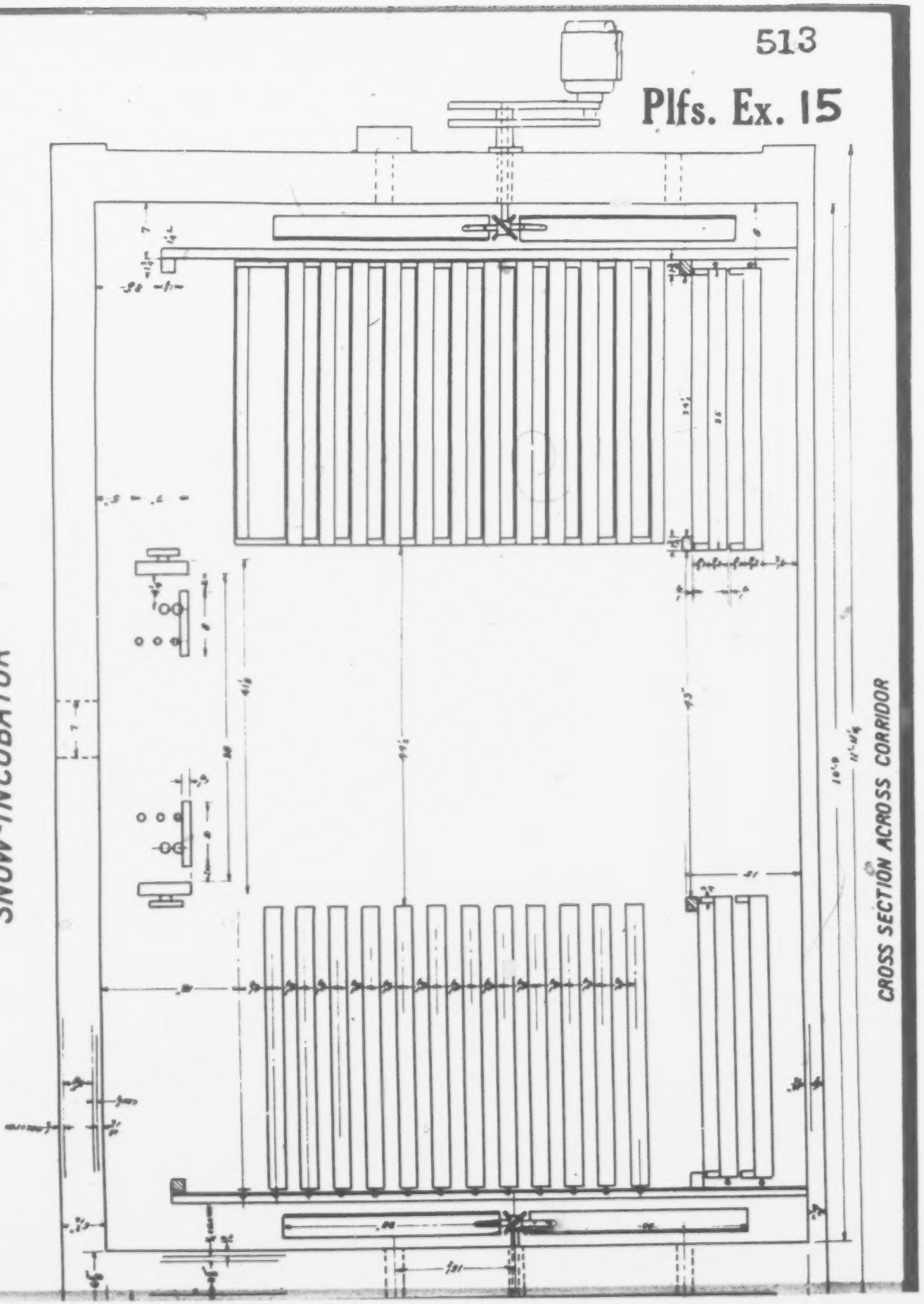
Fans were rotating counter clockwise 130-210 R.P.M.

Diagram of air currents on floor of incubator below bottom tray. K K

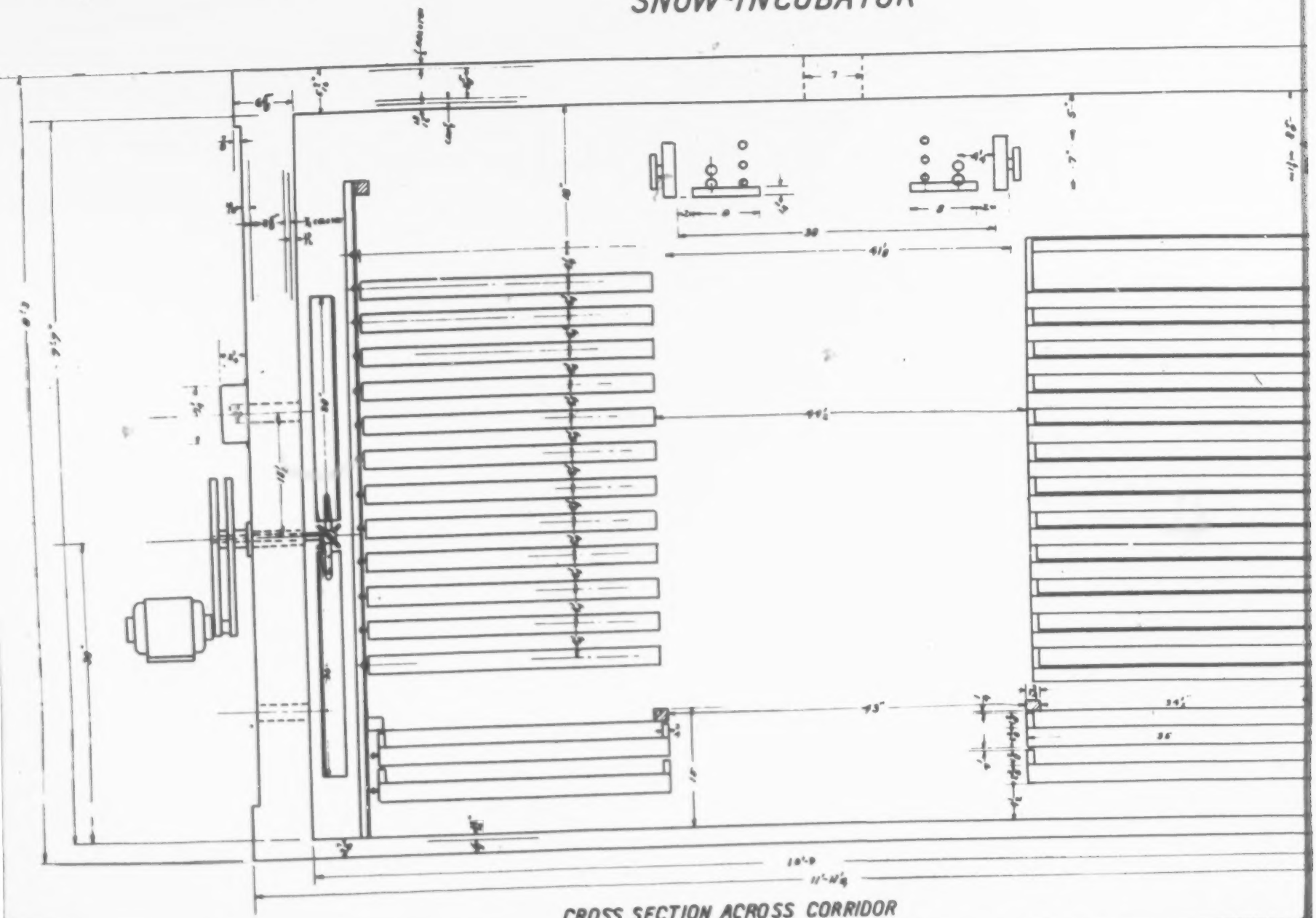
Arrows show general direction of air currents.
Numbers give approximate speed of currents as recorded by anemometer.

Fans were rotating counter clockwise 130-210 R.P.M.

Plfs. Ex. 15



SNOW-INCUBATOR



CROSS SECTION ACROSS CORRIDOR

Pfs. Ex. 18

515

No. 119 Eg (18)

City Sleepy Eye State Minn Date 6-3, 1925

Street County Brown, R. F. D.

Later

To Smith Incubator Company,
1982 West 74th St.
Cleveland, Ohio.

Please enter my (our) order for One (1) Smith Incubator (47,000 egg capacity) F. O. B.

The list price of said incubator is $6700.00. If this order is signed between the dates of June 15th, 1925, and January 1st, 1926, purchaser will receive off the list price, a discount amounting to one dollar per day for each day from the date of signing this order up to January 1st, 1926.

Purchaser will receive a further discount of $500.00 off the list price, provided full payment shall have been made in cash to Smith Incubator Company on or before the date said incubator is erected.

In consideration hereof I (we) agree to make the following payments to the order of Smith Incubator Company at 1982 West 74th Street, Cleveland, Ohio, to wit:

Cash payment with order $1000.00 $1000.00 by payment 10-10-1925	$2,000.00
One deferred payment, due May 1st, 1926	$1190.30
One deferred payment, due June 1st, 1926	$1100.00
One deferred payment, due May 1st, 1927	$1150.00
One deferred payment, due June 1st, 1927	$1150.00

Said deferred payments to be evidenced by notes, said notes to be dated and signed concurrently with this order, and to bear interest at the rate of six per cent per annum from and after October 1st, 1925.

This order is subject to the following conditions and provisions:

1. I (we) agree to transport the above incubator from railroad station to place where same is to be erected at my (our) expense, without delay and I (we) agree to pay all demurrage charges caused by my (our) delay in transporting same after arrival of goods at designated depot.

2. Smith Incubator Company agrees to erect said incubator without expense to me (us) and to test same by factory expert provided by Smith Incubator Company for one day free of charge to me (us), said test to be made on or before Oct 1st 1925, provided building is ready for occupancy 30 days prior to said date.

3. Smith Incubator Company is not to be held responsible for any delay in the completion of this contract caused by strikes, fires, floods, unavoidable accidents, war, delays in transportation, or any act of God, or other causes beyond its control, and in such case the time for completion of this contract shall be proportionately extended.

4. Title to the within described property shall remain in the Smith Incubator Company until the entire purchase price thereof and any note or notes including renewals given therefor, or any judgment for the whole or any part thereof has been paid in full, no matter by what manner or whatever degree said property may be attached to the realty, and I (we) hereby agree not to remove the said property from the place of original delivery so long as any part of the purchase price remains unpaid without first securing the written consent of the Smith Incubator Company.

5. I (we) further agree to assume the risk of loss and damage to said property and in case of any damage to said property by fire, water or any other cause, I (we) agree to pay to said Smith Incubator Company the amount of such damage, and in case of destruction thereof from any cause, to pay the above valuation, less any proportion of the purchase price which may have been paid, and I (we) agree to have said property fully insured in standard insurance companies at my (our) own expense, with loss payable to said Smith Incubator Company as its interest may appear, and if I (we) fail to have said property so insured, then the Smith Incubator Company may have the same fully insured and charge the premium to me (us), which shall be added to the purchase price of said property.

6. In case of my (our) failure to make any payment in time or in the manner as herein provided, the entire unpaid balance of purchase price shall become immediately due and payable, and the Smith Incubator Company, or its agents, may without legal process, re-take said property and operate same on the premises for the remainder of the hatching season for its own profit; and in any such event I (we) hereby agree to allow you free and unhindered access on the premises or in the building where said property is situated, or to make delivery of said property to you immediately upon request.

7. In the event of the Smith Incubator Company retaking said property as above provided, any amount that may have been paid thereon shall be considered as payment for use, ordinary wear and depreciation of said property while in my (our) possession, and shall be retained by the Smith Incubator Company. If the amount so paid does not cover the reasonable rental value of said property, then I (we) hereby agree to pay you on demand the balance of such reasonable rental. Nothing in this order shall be construed as obligating the Smith Incubator Company to accept return of property tendered in lieu of purchase price agreed to be paid.

8. All statutory provisions as to retaking and resale of the property within described are hereby expressly waived. If a claim hereunder is placed in attorney's hands for collection, ten per cent (10%) shall be added thereto and paid as attorney's fees.

9. Said Incubator is guaranteed by Smith Incubator Company to be of good workmanship and material and any defective part will be replaced any time within one year from date of erection.

10. This order covers all agreements between the Smith Incubator Company and me (us), either expressed or implied; and when approved by said company at its executive office becomes a contract between the parties as purchaser and seller, respectively. It is expressly agreed that the original hereof has been unconditionally released and delivered for transmission to the Smith Incubator Company, and that any notice or communication relating hereto or contemplated hereby shall be made in writing to said Company at Cleveland, Ohio and not otherwise.

Witness:

(Signed) E. H. Lusw

By

This order is subject to Approval of the Smith Incubator Company at Cleveland, Ohio.
Approved at Cleveland, Ohio.

SMITH INCUBATOR COMPANY.

To Smith Incubator Company,
1982 West 74th St.
Cleveland, Ohio.

Later

Please enter my (our) order for One (1) Smith Incubator (47,000 egg capacity) F. O. b. .....

The list price of said incubator is $6700.00. If this order is signed between the dates of June 15th, 1925, and January 1st, 1926, purchaser will receive off the list price, a discount amounting to one dollar per day for each day from the date of signing this order up to January 1st, 1926.

Purchaser will receive a further discount of $500.00 off the list price, provided full payment shall have been made in cash to Smith Incubator Company on or before the date said incubator is erected.

In consideration hereof I (we) agree to make the following payments to the order of Smith Incubator Company at 1982 West 74th Street, Cleveland, Ohio, to wit:

Cash payment with order $1000.00 $1000.00 by payment 10-7-10-7 1925	$2,000.00
One deferred payment, due May 1st, 1926	$1190.20
One deferred payment, due June 1st, 1926	$1100.00
One deferred payment, due May 1st, 1927	$1150.00
One deferred payment, due June 1st, 1927	$1150.00

Said deferred payments to be evidenced by notes, said notes to be dated and signed concurrently with this order, and to bear interest at the rate of six per cent per annum from and after October 1st, 1925.

This order is subject to the following conditions and provisions:

1. I (we) agree to transport the above incubator from railroad station to place where same is to be erected at my (our) expense, without delay and I (we) agree to pay all demurrage charges caused by my (our) delay in transporting same after arrival of goods at designated depot.

2. Smith Incubator Company agrees to erect said incubator without expense to me (us) and to test same by factory expert provided by Smith Incubator Company for one day free of charge to me (us), said test to be made on or before Oct 1st 1925 ....., provided building is ready for occupancy 30 days prior to said date.

3. Smith Incubator Company is not to be held responsible for any delay in the completion of this contract caused by strikes, fires, floods, unavoidable accidents, war, delays in transportation, or any act of God, or other causes beyond its control, and in such case the time for completion of this contract shall be proportionately extended.

4. Title to the within described property shall remain in the Smith Incubator Company until the entire purchase price thereof and any note or notes including renewals given therefor, or any judgment for the whole or any part thereof has been paid in full, no matter by what manner or whatever degree said property may be attached to the realty, and I (we) hereby agree not to remove the said property from the place of original delivery so long as any part of the purchase price remains unpaid without first securing the written consent of the Smith Incubator Company.

5. I (we) further agree to assume the risk of loss and damage to said property and in case of any damage to said property by fire, water or any other cause, I (we) agree to pay to said Smith Incubator Company the amount of such damage, and in case of destruction thereof from any cause, to pay the above valuation, less any proportion of the purchase price which may have been paid, and I (we) agree to have said property fully insured in standard insurance companies at my (our) own expense, with loss payable to said Smith Incubator Company as its interest may appear, and if I (we) fail to have said property so insured, then the Smith Incubator Company may have the same fully insured and charge the premium to me (us), which shall be added to the purchase price of said property.

6. In case of my (our) failure to make any payment in time or in the manner as herein provided, the entire unpaid balance of purchase price shall become immediately due and payable, and the Smith Incubator Company, or its agents, may without legal process, re-take said property and operate same on the premises for the remainder of the hatching season for its own profit; and in any such event I (we) hereby agree to allow you free and unhindered access on the premises or in the building where said property is situated, or to make delivery of said property to you immediately upon request.

7. In the event of the Smith Incubator Company retaking said property as above provided, any amount that may have been paid thereon shall be considered as payment for use, ordinary wear and depreciation of said property while in my (our) possession, and shall be retained by the Smith Incubator Company. If the amount so paid does not cover the reasonable rental value of said property, then I (we) hereby agree to pay you on demand the balance of such reasonable rental. Nothing in this order shall be construed as obligating the Smith Incubator Company to accept return of property tendered in lieu of purchase price agreed to be paid.

8. All statutory provisions as to retaking and resale of the property within described are hereby expressly waived. If a claim hereunder is placed in attorney's hands for collection, ten per cent (10%) shall be added thereto and paid as attorney's fees.

9. Said Incubator is guaranteed by Smith Incubator Company to be of good workmanship and material and any defective part will be replaced any time within one year from date of erection.

10. This order covers all agreements between the Smith Incubator Company and me (us), either expressed or implied; and when approved by said company at its executive office becomes a contract between the parties as purchaser and seller, respectively. It is expressly agreed that the original hereof has been unconditionally released and delivered for transmission to the Smith Incubator Company, and that any notice or communication relating hereto or contemplated hereby shall be made in writing to said Company at Cleveland, Ohio and not otherwise.

Witness: .....

(Signed) E. H. Lucas

By .....

This order is subject to Approval of the Smith Incubator Company at Cleveland, Ohio.
Approved at Cleveland, Ohio.

SMITH INCUBATOR COMPANY.

This 29 day of Dec, 1925

By L B Burk

Date received at home office of Smith Incubator Co. .....

#377

(19)

RECORD COVERING GROSS SALES OF FORCED DRAFT INCUBATORS

VALUE	EGG CAPACITY	YEAR	SMITH NUMBER UNITS	SMITH VALUE	SMITH EGG CAPACITY	COMBINED SMITH AND BUCKEYE NUMBER UNITS	COMBINED SMITH AND BUCKEYE VALUE	COMBINED SMITH AND BUCKEYE EGG CAPACITY
1,740.00	Not Known					39	1,740.00	
6,382.95	" "					103	38,382.95	
3,771.33	" "					166	93,771.33	
7,718.85	" "					215	217,718.85	
0,299.41	1,435,152					256	270,299.41	1,435,152
4,497.13	4,470,384	1922	60	437,500.00	2,620,000	617	1,141,997.13	7,290,384
5,847.66	5,737,248	1923	84	564,000.00	3,948,000	791	1,309,847.66	9,685,248
3,017.75	6,059,052	1924	79	538,720.00	3,713,000	924	1,331,737.75	9,772,052
7,399.49	10,879,332	1925	143	918,930.00	6,721,000	1,301	2,176,329.49	17,600,332
0,042.13	15,839,700	1926	321	2,106,051.00	15,087,000	1,890	3,286,093.13	30,926,700
5,432.26	18,755,208	1927	327	2,162,479.50	15,369,000	1,777	3,957,911.76	31,824,208
9,084.44	6,069,388	1928	170	1,125,321.00	8,615,000	783	1,795,305.44	14,684,388
2,227.27	12,724,368	1929	345	2,179,453.50	16,928,000	1,385	3,491,680.77	29,652,368
3,783.77	7,778,412	1930	264	1,615,900.25	12,653,000	883	2,448,684.02	20,438,412
7,416.36	9,932,610	1931	59	385,713.50	2,738,000	822	1,363,131.86	12,670,810
5,844.78	1,066,614	1932	33	179,015.50	1,501,200	181	354,860.26	1,567,614
8,987.56	98,247,728		1,885	12,213,084.25	90,030,000	12,113	23,940,071.81	188,337,728

32 to June 30th
32 to October 31st

Plaintiff's Exhibit 19

517

RECORD COVERING GROSS SALES OF FORCED DRAFT INCUBATORS

YEAR	BUCKEYE NUMBER UNITS	BUCKEYE VALUE	BUCKEYE EGG CAPACITY	YEAR	SMITH NUMBER UNITS	SMITH VALUE	SMITH EGG CAPACITY	COMBINED SMITH AND BUCKEYE NUMBER UNITS	COMBINED SMITH AND BUCKEYE VALUE
1917	39.	1,740.00	Not Known					39	1,740.00
1918	103	38,262.95	" "					103	38,262.95
1919	166	93,771.33	" "					166	93,771.33
1920	215	217,718.85	" "					215	217,718.85
1921	236	270,239.41	1,435,152					236	270,239.41
1922	557	684,497.13	4,470,384	1922	60	437,500.00	2,820,000	617	1,121,997.13
1923	707	715,847.66	5,737,248	1923	84	584,000.00	3,948,000	791	1,309,847.66
1924	845	773,017.75	6,059,052	1924	79	528,720.00	3,713,000	924	1,301,737.75
1925	1,158	1,147,399.49	10,879,332	1925	143	928,930.00	6,721,000	1,301	2,176,329.49
1926	1,569	1,820,042.13	15,839,700	1926	321	2,106,051.00	15,087,000	1,890	3,926,093.13
1927	1,450	1,725,432.26	18,255,208	1927	327	2,162,479.50	15,369,000	1,777	3,957,911.76
1928	613	669,984.44	6,069,388	1928	170	1,125,321.00	8,615,000	783	1,795,305.44
1929	1,040	1,312,227.27	12,714,368	1929	345	2,179,453.50	16,928,000	1,385	3,491,680.77
1930	619	835,783.77	7,778,411	1930	264	1,615,900.25	12,653,000	883	2,448,684.02
1931	763	997,416.36	9,932,610	1931	59	365,713.50	2,738,000	822	1,363,131.86
1932	148	175,844.78	1,066,814	1932	33	179,015.50	1,501,200	181	354,860.28
	10,228	11,726,987.56	98,247,728		1,885	12,215,084.25	90,090,000	12,113	23,940,071.81

Buckeye - 1932 to June 30th
Smith - 1932 to October 31st

Plaintiff's Exhibit 20 No. 719 E. 519

HATCHERY IN CONNECTION

SERVICE AND QUALITY

E. H. SNOW

Hardware and Plumbing

RECEIVED

NOV 3 1924

10-30.24

Dr. S. B. Smith,
Smith Incubator Co.,
Cleveland, Ohio.

Dear Sirs:

We have been operating a double deck incubator for sometime; in a small way last spring, we converted this into a force draft machine, with very unsatisfactory results, so we dismantled it shortly after.

As we have practically lost money on every turn of the baby chick business, it has been rather discouraging.

In accordance with your literature which we have received from you regarding your incubator users, looks good.

Up to date we have been undecided what to do, in regard to what machine to buy. Mr. Isackson with the Buckeye Co., called on us yesterday and tried to sell us a Buckeye machine.

We would like very much to own one of your machines but there is a considerable amount of money involved. Kindly cuote us your very best terms.

Also what would your charges be if we built a machine like the Smith?

Kindly let us hear from you at your earliest convenience.

With best regards.

E. H. Snow.

NOV 3 1924 10-30.24

Dr. S. B. Smith,
Smith Incubator Co.,
Cleveland, Ohio.

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Also what would your charges be if we built a machine like the Smith?

Kindly let us hear from you at your earliest convenience.

With best regards.

E. B. Snow.

Lennox Torrid Zone Furnaces

Plaintiff's Exhibit 21

No. 3114 Eq

Nov. 4th, 1924.

Mr. E. H. Snow,
Sleepy Eye, Minn.

My dear Mr. Snow:

cy made for our files
11/14/32 GMS

Yours 30th ult. at hand. It just so happens that our Minnesota representative, Mr. T. A. Vesper, is in Minnesota this week and we are arranging to have him call upon you and explain thoroughly our proposition. The price of our machine today (Nov. 4th) is $6442.00. The terms are $3000.00 cash with order, one note for $1721.00 due next May and one note for $1721.00 due next June. Our delivery schedule is fast filling up and we should like to ask you to favor us by placing the orier as early as possible if you decide to increase with a Smith this year.

Regarding your inquiry about what our charges would be if you built a machine like the Smith would state that this would involve the patents and for that reason we could not permit it to be done. For your information will state that several people have built their own machines but upon finding that they had infringed the patents they have torn their machines down and in most cases have replaced them with Smiths.

Yours very truly,

SMITH INCUBATOR COMPANY

Nov. 4th, 1924.

Mr. E. H. Snow,
Sleepy Eye, Minn.

My dear Mr. Snow:

cy made for our files
11/14/32 GMS

Yours 30th ult. at hand. It just so happens that our Minnesota representative, Mr. T. A. Vesper, is in Minnesota this week and we are arranging to have him call upon you and explain thoroughly our proposition. The price of our machine today (Nov. 4th) is $6442.00. The terms are $3000.00 cash with order, one note for $1721.00 due next May and one note for $1721.00 due next June. Our delivery schedule is fast filling up and we should like to ask you to favor us by placing the order as early as possible if you decide to increase with a Smith this year.

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Yours very truly,

SMITH INCUBATOR COMPANY

C. R. JENNEY

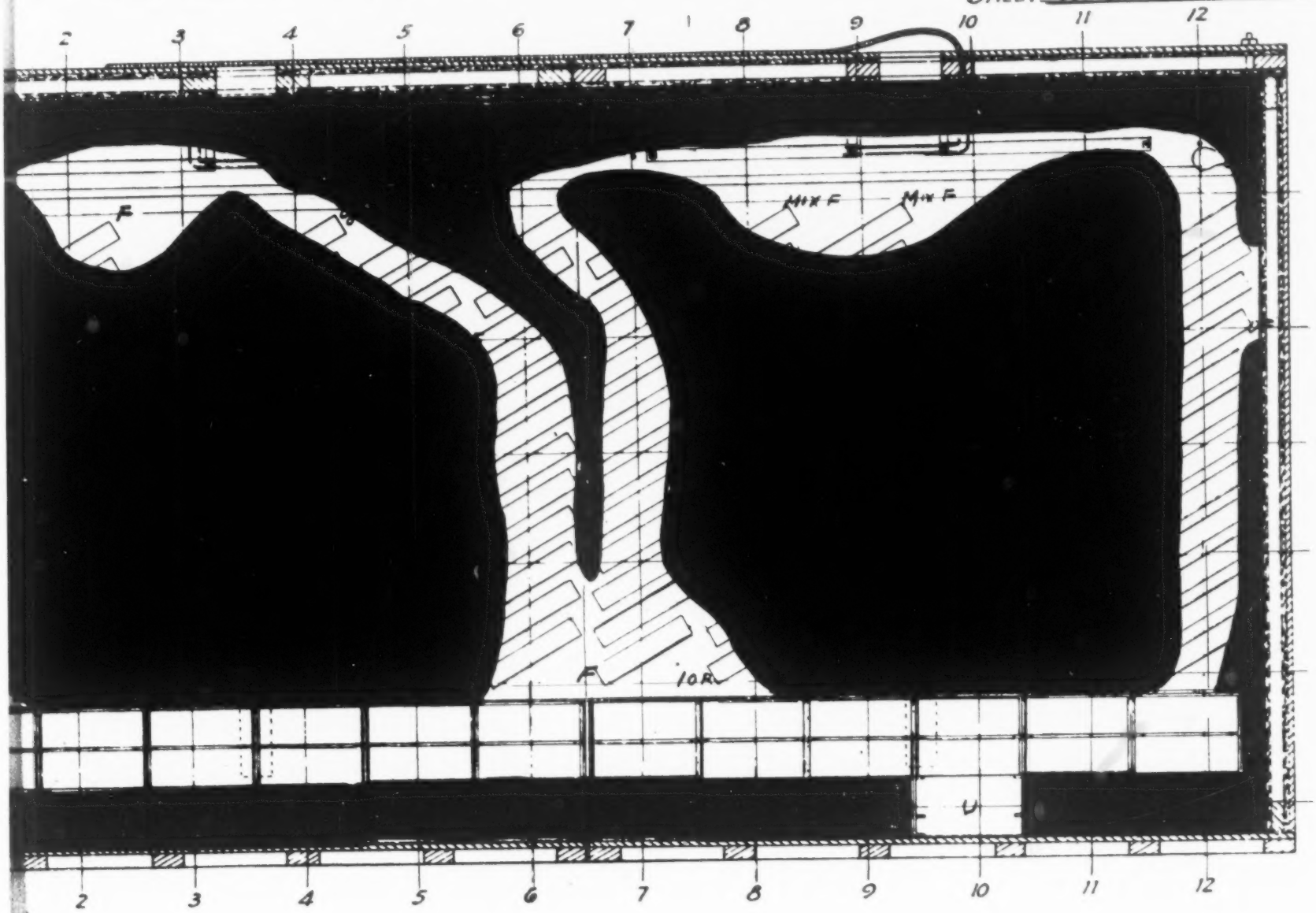
CRJ'PMC.
CC T A Vesper

No. 8119 E.J. DATE Nov. 14. 32

TIME 2.05 - 2.25

SHEET No 3.

Test taken on line B B Test Diagram No 1.



Plfs. Ex. 22

TEST DIAGRAM NO 2

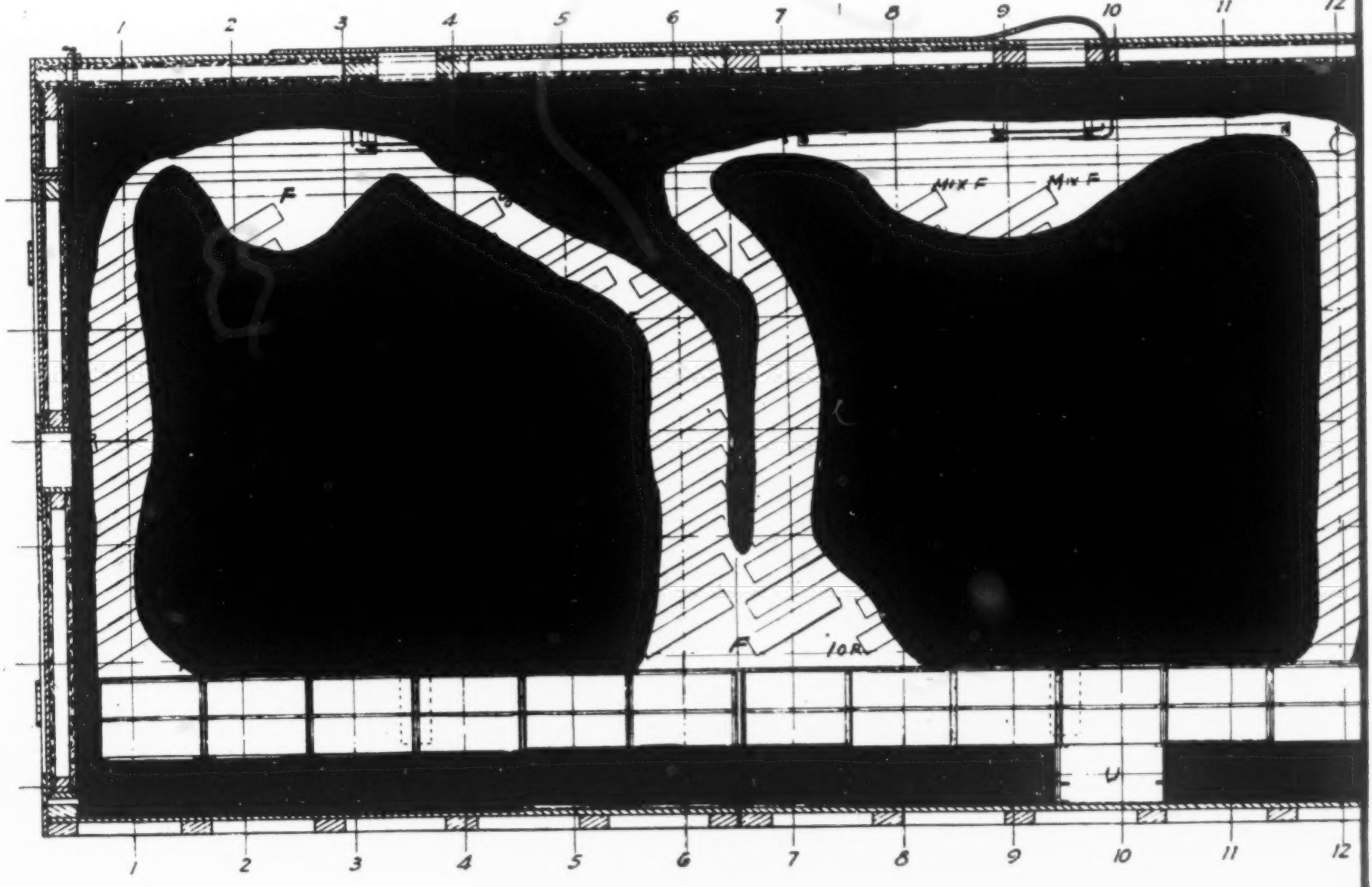
SNOW INCUBATOR

Frank B Bowley

523

Date taken on line B B Test Diagram No 1.

No 3119 E. DATE Nov. 14. 32
TIME 2:05° - 2:25
SHEET No 3.



TEST DIAG
SNOW IN

Frank B Bowley

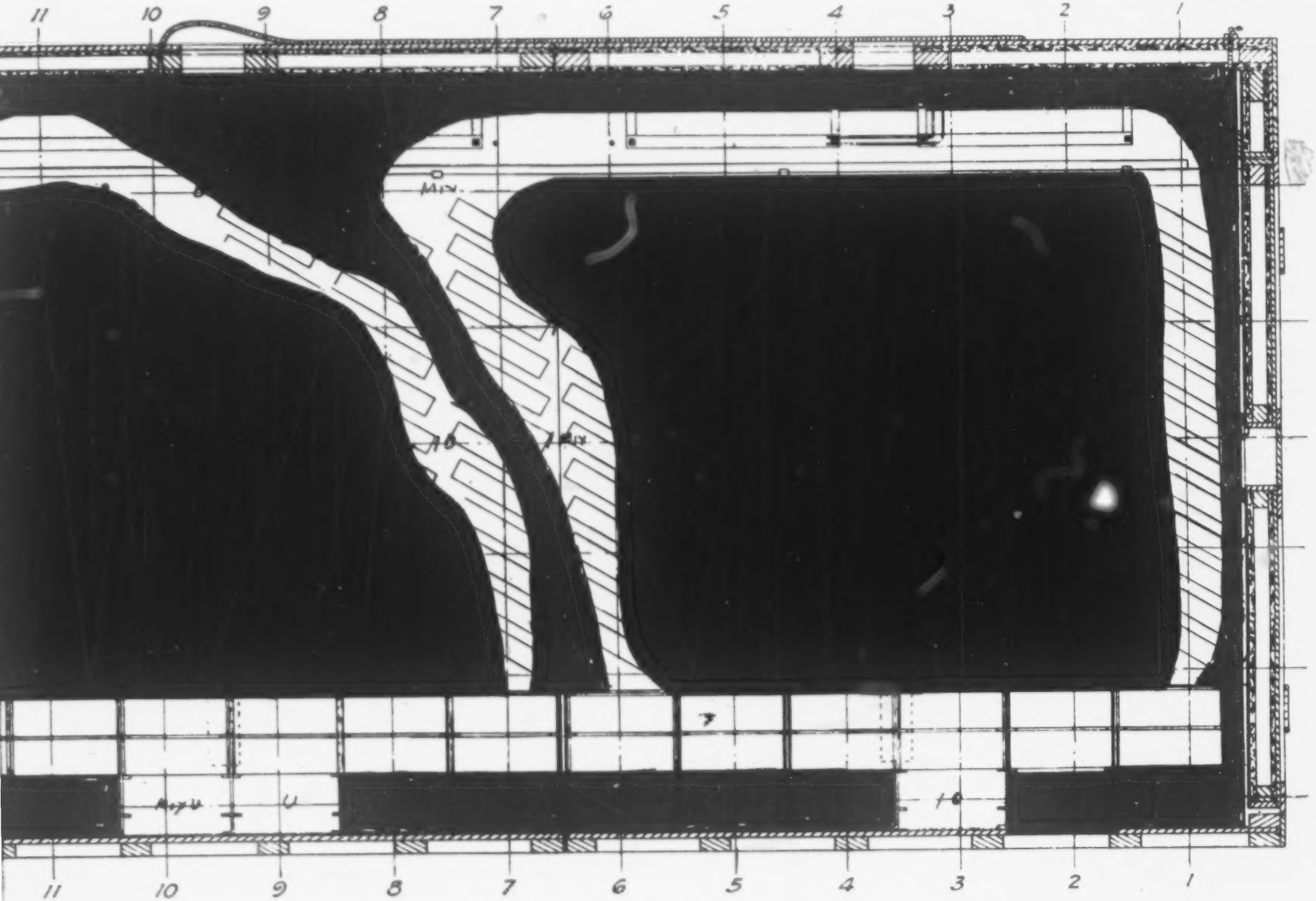
No. 3119

DATE Nov 14-32

TIME 2:00 P - 2:55

SHEET 2

ata on line D D Test Diagram No 1



Plfs. Ex. 23

525

TEST DIAGRAM NO. 3

SNOW INCUBATOR

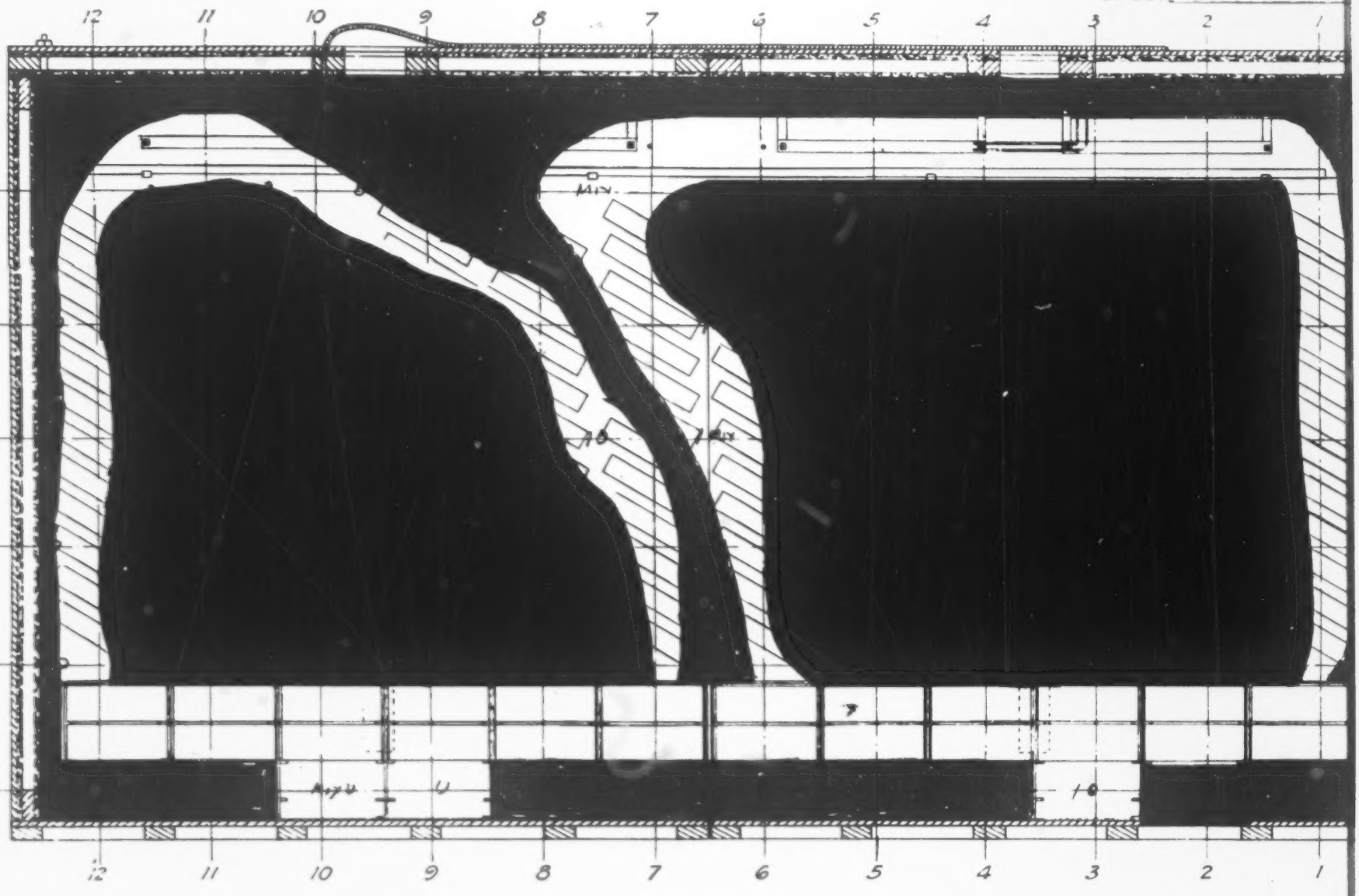
Frank B Rooley

Data on line DD Test Diagram No 1

DATE Nov 4 32

TIME 2:08 - 25

SHEET 2



TEST DIAG

Frank B Baxley SNOW IN

708 Plaintiff's Exhibit.
No. 14 (Model).
To Be Treated And Dealt
With Under Provisions Of
C. C. A. Rule 34.

FOLD OUTS NOT INCLUDED

740 Defendant's Exhibit
O (Certified Copy
Of File Wrapper)
To Be Treated And Dealt With
Under Provisions Of C. C. A.
Rule 34.

Memorandum of Clerk of U. S. Circuit Court of Appeals:

The above exhibit was later certified to the Circuit Court of Appeals and a copy thereof will be found at the end of this printed record.

741 (Defendants' Exhibit P, Letters Patent No. 120,253 to H. Endemann, October 24, 1871.)

594

H. ENDEMANN.

Improvement in Apparatus for Drying Fruits, Meat, &c

No. 120,253. Patented Oct. 24, 1871.

Fig. 1.

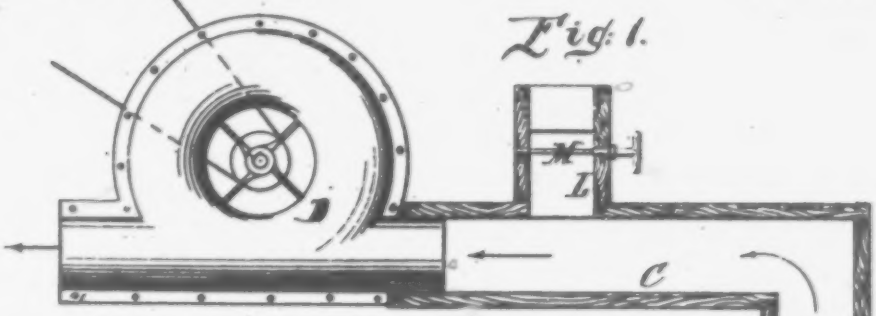
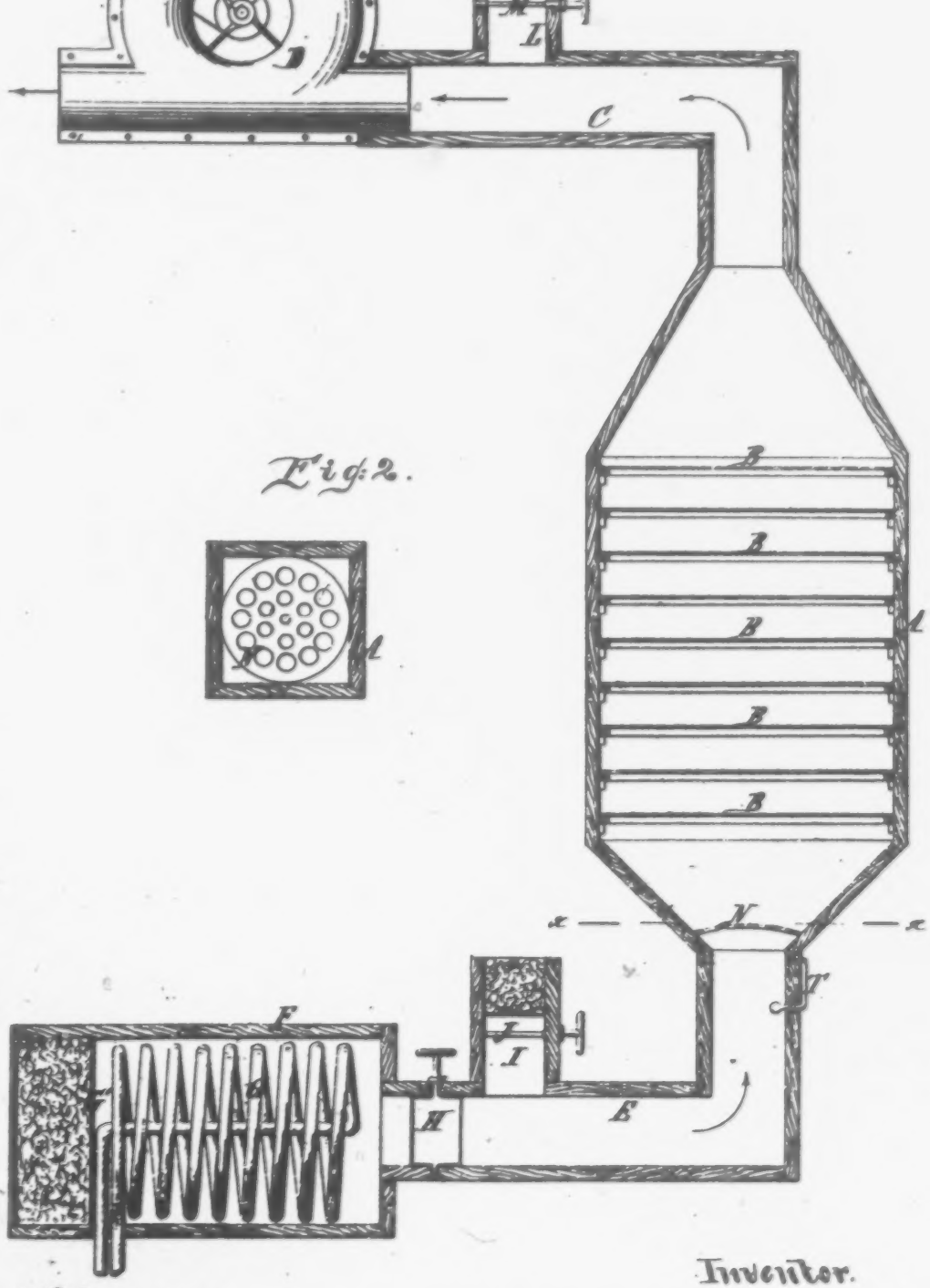


Fig. 2.



Witnesses.

Inventor.

UNITED STATES PATENT

HERMANN ENDEMANN, OF NEW YORK, N

IMPROVEMENT IN APPARATUS FOR DRYING FRUI

Specification forming part of Letters Patent No. 120,253, dated Oct

To all whom it may concern:

Be it known that I, HERMANN ENDEMANN, of the city, county, and State of New York, have invented a new and Improved Drying Apparatus; and I do hereby declare the following to be a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawing, forming part of this specification, in which drawing—

Figure 1 represents a vertical section of this apparatus. Fig. 2 is a horizontal section of the same in the plane *x x*, Fig. 1.

Similar letters indicate corresponding parts.

This invention consists in the combination of a drying-room containing shelves or trays for the reception of the articles to be dried, with an air-heater, with an air-exhauster, and with suitable valves in the pipe leading into and out of the drying-chamber in such a manner that, by the action of said air-exhauster, a current of hot air can be drawn through the drying-chamber, and by opening the valves in the air or discharge-pipes the temperature of the air passing through the drying-chamber can be regulated with the greatest accuracy.

In the drawing, A designates a chamber, which may be made of wood lined with sheet metal or of any other suitable bad conductor of heat, and which is provided with ribs or lugs to support a series of shelves or platforms, B, so constructed that they can be readily removed from or inserted in the drying-chamber, said chamber being provided with a door to give convenient access to its interior. The platforms or trays are composed of frames supporting bottoms of wire-netting or perforated sheet metal, and on them are spread the articles to be dried. From the top of the drying-chamber extends a pipe, C, which connects with an air-exhauster, D, of any suitable construction, and from the bottom of said drying-chamber extends a pipe, E, to a chamber, F, which contains a steam-coil, G. The mouth of the air-chamber F is covered by a sieve, G′, which supports a quantity of loose cotton, so that the air passing in said air-chamber is freed from impurities. In the air-supply pipe E is situated a damper, H, to close the same, and from said pipe rises a nozzle, I, furnished with a valve, J, and protected by a quantity of loose cotton resting on a sieve, K. From the exhaust-pipe C extends a nozzle, L, provided w
the junction of the ai
ing-chamber is placed
lar, while the transv
chamber is square, a
perforations of the si
and they increase gra
ference. By this arra
passing in from the
evenly distributed th
ber. A thermometer
pipe allows of observ
air passing up into th

When the air-exhau
rent of air is caused t
ber F, where the same
tact with the steam-c
ed air passes up throu
air is freed from its
the mouth of the air-c
to reduce the temper
in the supply-pipe E
a quantity of cold air
that has passed the
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H. ENDEMANN.

Improvement in Apparatus for Drying Fruits, Meat, &c.

No. 120,253. Patented Oct. 24, 1871.

Fig. 1.

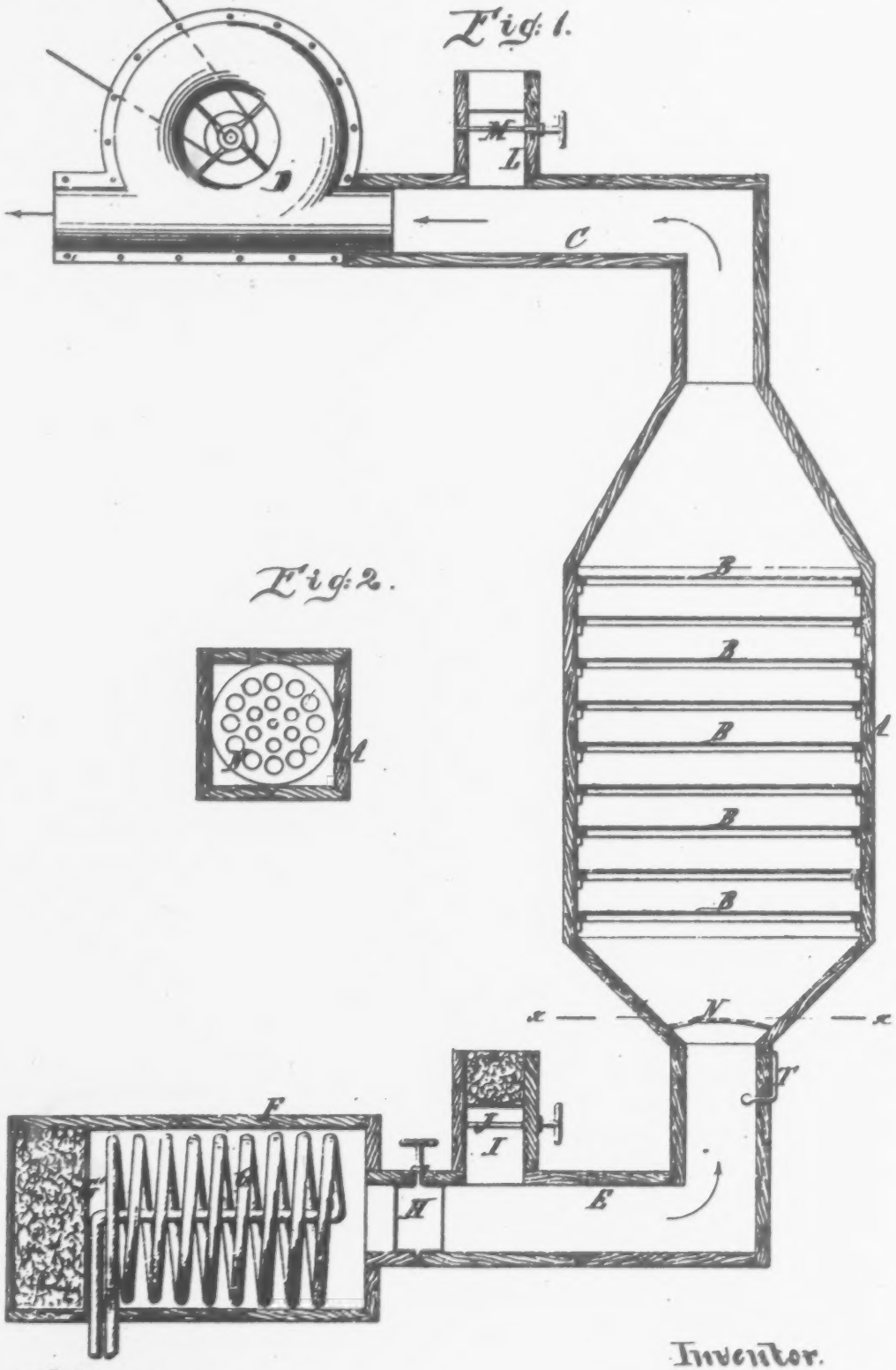

Fig. 2.

Witnesses.

C. Wahlert.

E. Bilhuber

Inventor.

H. Endemann

UNITED STATES PATENT

HERMANN ENDEMANN, OF NEW YORK, N

IMPROVEMENT IN APPARATUS FOR DRYING FRUIT

Specification forming part of Letters Patent No. 120,253, dated Octo

To all whom it may concern:

Be it known that I, HERMANN ENDEMANN, of the city, county, and State of New York, have invented a new and Improved Drying Apparatus; and I do hereby declare the following to be a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawing, forming part of this specification, in which drawing—

Figure 1 represents a vertical section of this apparatus. Fig. 2 is a horizontal section of the same in the plane *x x*, Fig. 1.

Similar letters indicate corresponding parts.

This invention consists in the combination of a drying-room containing shelves or trays for the reception of the articles to be dried, with an air-heater, with an air-exhauster, and with suitable valves in the pipe leading into and out of the drying-chamber in such a manner that, by the action of said air-exhauster, a current of hot air can be drawn through the drying-chamber, and by opening the valves in the air or discharge-pipes the temperature of the air passing through the drying-chamber can be regulated with the greatest accuracy.

In the drawing, A designates a chamber, which may be made of wood lined with sheet metal or of any other suitable bad conductor of heat, and which is provided with ribs or lugs to support a series of shelves or platforms, B, so constructed that they can be readily removed from or inserted in the drying-chamber, said chamber being provided with a door to give convenient access to its interior. The platforms or trays are composed of frames supporting bottoms of wire-netting or perforated sheet metal, and on them are spread the articles to be dried. From the top of the drying-chamber extends a pipe, C, which connects with an air-exhauster, D, of any suitable construction, and from the bottom of said drying-chamber extends a pipe, E, to a chamber, F, which contains a steam-coil, G. The mouth of the air-chamber F is covered by a sieve, G′, which supports a quantity of loose cotton, so that the air passing in said air-chamber is freed from impurities. In the air-supply pipe E is situated a damper, H, to close the same, and from said pipe rises a nozzle, I, furnished with a valve, J, and protected by a quantity of loose cotton resting on a sieve, K. From the exhaust-pipe C extends a nozzle, L, provided w
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H. ENDEMANN.

n Apparatus for Drying Fruits, Meat, &c.

Patented Oct. 24, 1871.

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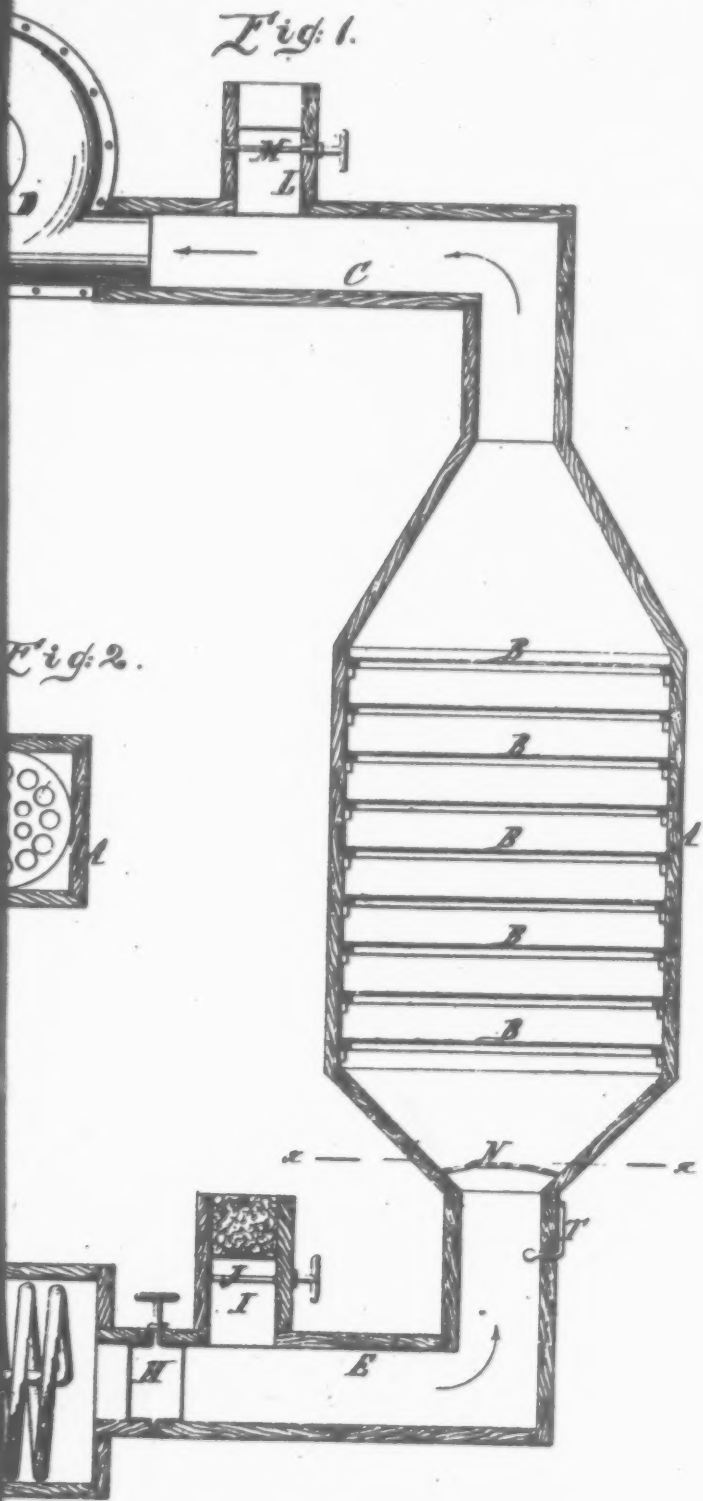

Fig. 2.

Inventor.

UNITED STATES PATENT OFFICE

HERMANN ENDEMANN, OF NEW YORK, N. Y.

IMPROVEMENT IN APPARATUS FOR DRYING FRUITS, MEATS, &c.

Specification forming part of Letters Patent No. 120,253, dated October 24, 1871.

To all whom it may concern:

Be it known that I, HERMANN ENDEMANN, of the city, county, and State of New York, have invented a new and Improved Drying Apparatus; and I do hereby declare the following to be a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawing, forming part of this specification, in which drawing—

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When the air-exhauster is set in motion a current of air is caused to pass through the air-chamber F, where the same is heated by coming in contact with the steam-coil and this current of heated air passes up through the drying-chamber. This air is freed from its impurities by the cotton in the mouth of the air-chamber F. If it is desired to reduce the temperature of the air the valve J in the supply-pipe E is opened, and consequently a quantity of cold air will be mixed with the air that has passed the steam-coil. If it is desired to increase the temperature of the air in the drying-chamber, the valve M in the exhaust-pipe is opened; and thereby the speed of the air passing through the steam-coil is reduced, and consequently its temperature is raised.

In using my apparatus in desiccating meat, where the temperature of the air must not rise above 140° Fahrenheit, I construct the same in the following proportions: I make a steam-coil of one-half inch pipe, pass steam of forty pounds, pressure through it, and extend said steam-coil to such a length that I obtain two square feet of heating-surface for every cubic foot of air passing through the same per minute. For instance, if the capacity of the drying-chamber is twenty-eight cubic feet and the exhauster takes off fourteen cubic feet of air per minute, the heating-surface of the steam-coil must be twenty-eight square feet.

In some cases I have found it of advantage to place the exhauster at the bottom of the drying-chamber and the steam-coil at the top, so as to dry with a downward current of air; but in this case the temperature of the air cannot be raised above 125°, since air of a higher temperature cannot be made to travel downward in a uniform current except by a regular exhaust-pump. It is

obvious that for a steam-coil any other suitable air-heating apparatus can be substituted.

With my apparatus, constructed as above described, I am enabled to dry beef or other meat in three hours so that it can be packed and preserved for a long time.

What I claim as new, and desire to secure by Letters Patent, is—

The combination of an air-exhauster and an air-heating apparatus with a drying-chamber and with valves J M, which allow of regulating the temperature of the air made to pass through the drying-chamber by the action of the exhauster, substantially as herein shown and described.

H. ENDEMANN.

Witnesses:
H. P. ALLEN,
WILLIAM ROBERTS.

(48)

745 (Defendants' Exhibit P, Letters Patent
E. A. Jones and C. W. Jones, June 30, 1

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H. ENDEMANN.

Witnesses:
H. P. ALLEN,
WILLIAM ROBERTS.

(48)

745 (Defendants' Exhibit P, Letters Patent No. 152,644 to E. A. Jones and C. W. Jones, June 30, 1874.)

598

2 Sheets--Sheet 2.

E. A. JONES & C. W. JONES.

Fruit-Driers.

No. 152,644.

Patented June 30, 1874.

Fig. 3.

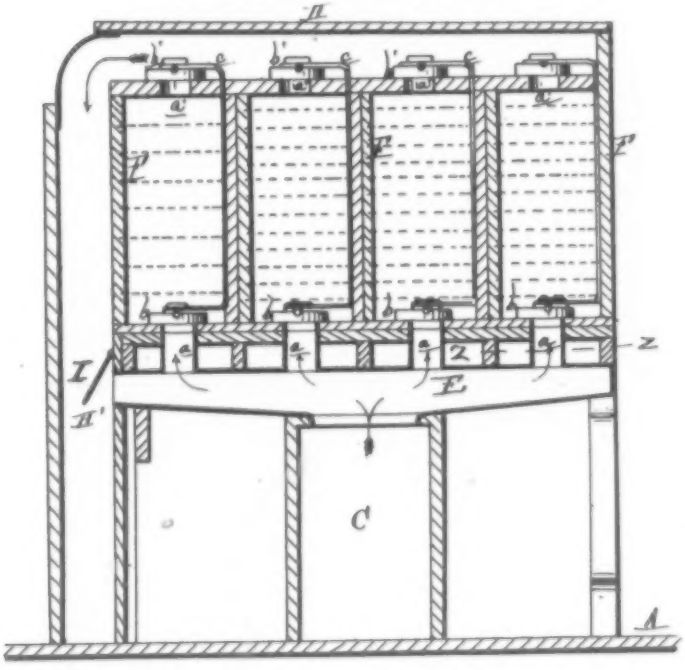


Fig. 4.

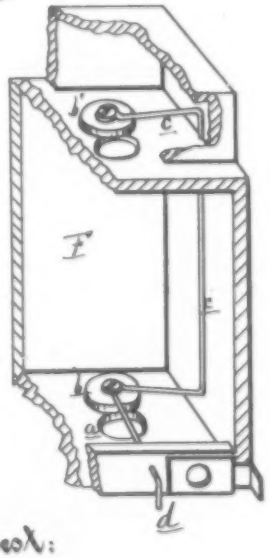
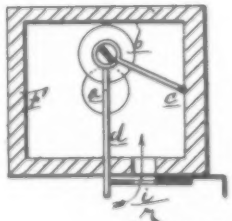


Fig. 5.



Witnesses:
W. W. Sprague
Ed. Barthel

Inventors:
E. A. Jones
C. W. Jones
By Attorney
Thos. S. Sprague

600

2 Sheets--Sheet 1.

E. A. JONES & C. W. JONES.

Fruit-Driers.

No. 152,644. Patented June 30, 1874.

Fig. 1.

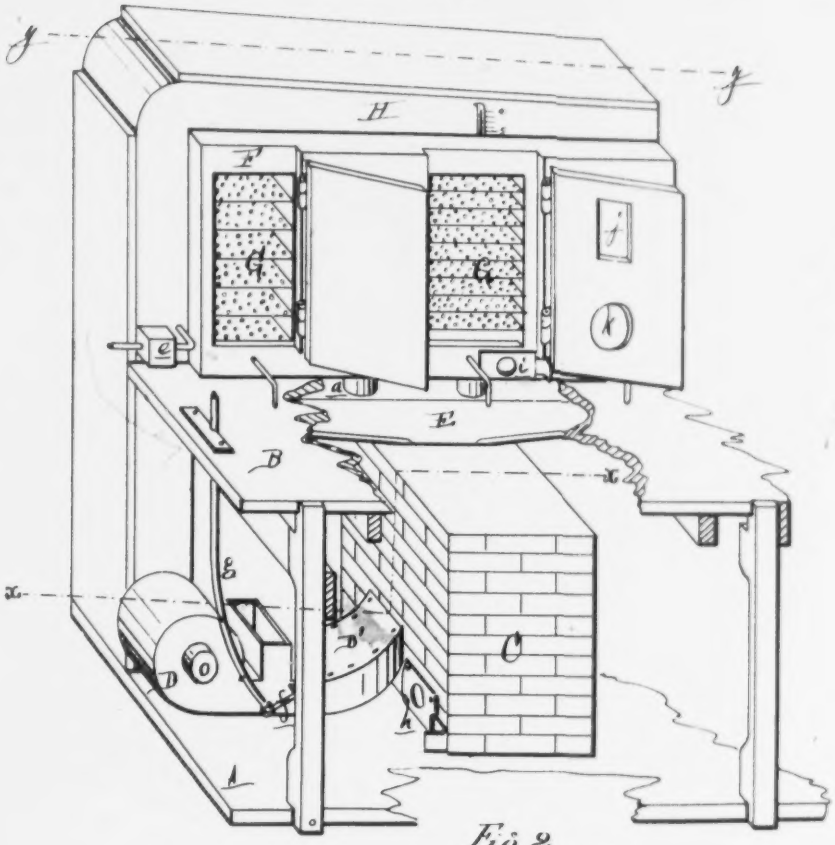
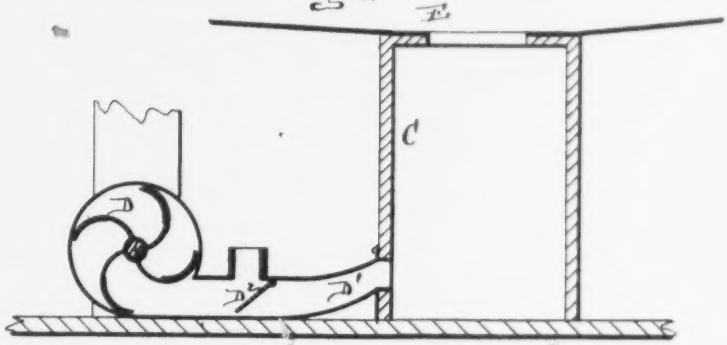


Fig. 2.



Attest:
W. W. Sprague
Ed Bartlett

Inventors:
E. A. Jones
C. W. Jones
By Attorney
Thos. S. Sprague

UNITED STATES PATENT

EDGAR A. JONES, OF STURGIS, AND CHARLES W. JONE
MICHIGAN.

IMPROVEMENT IN FRUIT-DRIERS.

Specification forming part of Letters Patent No. **132,614**, dated June 30,
May 22, 1874.

To all whom it may concern:

Be it known that we, EDGAR A. JONES, of Sturgis, and CHARLES W. JONES, of Centreville, in the county of St. Joseph and State of Michigan, have invented a certain new and useful Fruit-Drier, of which the following is a specification:

The object of our invention is to so construct and arrange a series of chambers placed side by side on the second floor of a building, each chamber being adapted to receive trays or screens containing fruit, and connected at the bottom with the air-trunk of a hot-air furnace, and at the top with a flue connected with an exhaust-fan, that the heated-air currents may be caused to circulate through the several chambers independently of each other, and back into the furnace, or be discharged into the open air, or a portion be so discharged, and the remainder be returned to the furnace, the chambers being also provided with air-valves so arranged that the temperature of each chamber may be regulated to the requirements of the matter being treated therein, regardless of the temperature of the other chambers.

Figure 1, Sheet 1, is a perspective view of our drier as erected in a building, a portion of which is shown in section. Fig. 2 is a longitudinal vertical section of the blower and trunk at *x x*. Fig. 3, Sheet 2, is a vertical transverse sectional elevation at *y y*. Fig. 4 is a sectional perspective view of a drying-chamber, showing the arrangement of its valves. Fig. 5 is a horizontal section at *z z*, showing the cold-air inlet and regulating-slide.

In the drawing, A represents the basement, and B the first or any other [illegible] above it in a building. C is an air-heating furnace of suitable construction, with which is connected the blast-pipe D^1 of an exhaust-fan, D, driven from any convenient source of power. E is a hot-air trunk, communicating with the top of the furnace. F are chambers entirely disconnected from each other, although placed side by side. The trunk E communicates with the bottom of each chamber through a short pipe, *a*. G are fruit trays or screens of wire-cloth

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2 Sheets--Sheet 1.

E. A. JONES & C. W. JONES.

Fruit-Driers.

Patented June 30, 1874.

Fig 1.

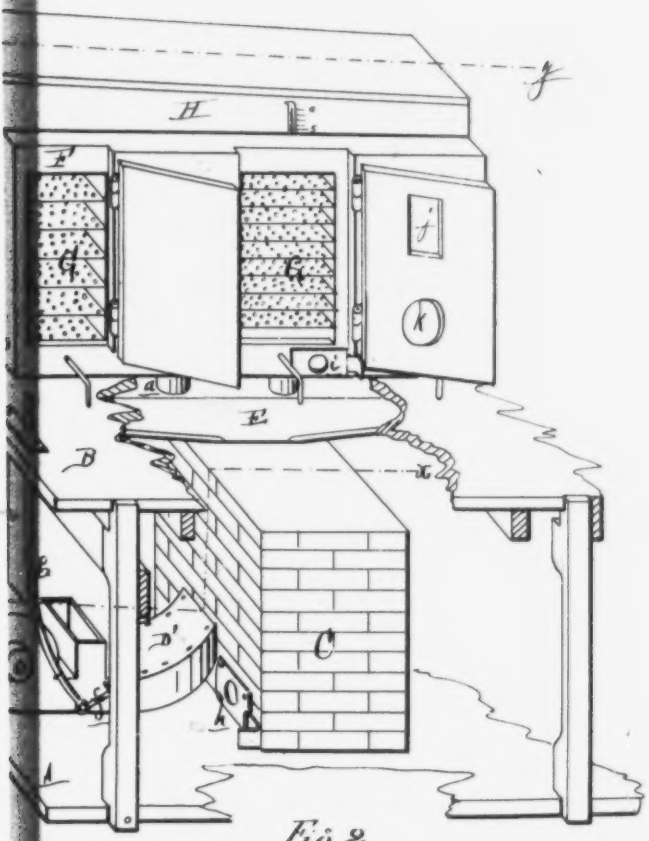
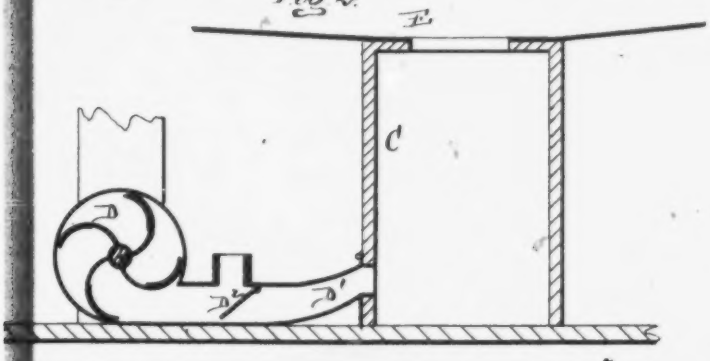


Fig 2.



Inventors:
E. A. Jones
C. W. Jones
By Attorney
Thos. S. Sprague

UNITED STATES PATENT OFFICE.

EDGAR A. JONES, OF STURGIS, AND CHARLES W. JONES, OF CENTREVILLE, MICHIGAN.

IMPROVEMENT IN FRUIT-DRIERS.

Specification forming part of Letters Patent No. **152,644**, dated June 30, 1874; application filed May 22, 1874.

To all whom it may concern:

Be it known that we, EDGAR A. JONES, of Sturgis, and CHARLES W. JONES, of Centreville, in the county of St. Joseph and State of Michigan, have invented a certain new and useful Fruit-Drier, of which the following is a specification:

The object of our invention is to so construct and arrange a series of chambers placed side by side on the second floor of a building, each chamber being adapted to receive trays or screens containing fruit, and connected at the bottom with the air-trunk of a hot-air furnace, and at the top with a flue connected with an exhaust-fan, that the heated-air currents may be caused to circulate through the several chambers independently of each other, and back into the furnace, or be discharged into the open air, or a portion be so discharged, and the remainder be returned to the furnace, the chambers being also provided with air-valves so arranged that the temperature of each chamber may be regulated to the requirements of the matter being treated therein, regardless of the temperature of the other chambers.

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In the drawing, A represents the basement, and B the first or any other floor above it in a building. C is an air-heating furnace of suitable construction, with which is connected the blast-pipe D^1 of an exhaust-fan, D, driven from any convenient source of power. E is a hot-air trunk, communicating with the top of the furnace. F are chambers entirely disconnected from each other, although placed side by side. The trunk E communicates with the bottom of each chamber through a short pipe, *a*. G are fruit trays or screens of wire-cloth or other material of open texture, adapted to support the fruit or vegetables to be dried, which trays are supported, one above the other, on cleats, or in grooves in the sides of said chambers, in the top of each of which is an outlet, *a'*, for the heated-air currents, which are more or less charged with moisture. *b* is a valve, pivoted by a central stud on its top to the lower arm of a C-shaped valve-stem, *c*, whose vertical arm is journaled in a groove in one side of the chamber. To its upper arm is pivoted a valve, *b'*, both valves being simultaneously operated by a valve-rod, *d*, coupled to the pivot of the lower, and extending through an opening in the front of the chamber. H is an exhaust-trunk, which extends along the top of all the chambers, and includes their several openings *a'* and valves *b'*. At one end it is closed, while the other end, H', is dropped to communicate with the exhaust-fan, being intersected, however, by an open end of the hot-air trunk E, which is closed by a self-acting flap-valve, I, whose crank-arm is provided with a sliding weight, *e*, the purpose of which valve will be presently explained. The blast-pipe D^1 of the fan is provided with a cut-off valve, D^2, whose crank *f* is connected with a rod, *g*, passing up through a plate in the floor above, by opening which valve (which thereby cuts off the blast from the furnace) the air and vapors are exhausted from the chambers by the fan, and discharged into the open air. By closing the valve more or less, a part or the whole volume of the air drawn from the chambers may be returned into the furnace, to be again circulated through the fruit-chambers after being raised in temperature, thereby economizing in the fuel required to heat the air.

The valves *b b'* permit any chamber to be cut off from the circulating current without interfering with any other chamber; but, if it should so happen that all the chambers were cut off at the same time, or but one or two chambers were in use, the pressure of air in the trunk E would open the valve I, and let the whole or a part of the volume of air in motion circulate through the trunk H' and fan, and into the furnace again. When the circulation from the fan into the furnace is cut off

by the valve D^2, fresh air can be admitted to the furnace through an opening therein fitted with a slide, *h*.

i is a slide fitted to the front of the lower part of each chamber over an opening therein, through which cold air can be admitted to modify or temper the heat in any chamber containing articles which require to be dried at a lower temperature.

The door of each chamber is fitted with a glass, *j*, through which the condition of the contents can be observed; also, with a plate, *k*, pivoted over a hand-hole, through which a sample of the article being dried can be withdrawn without being obliged to open the entire door, and thus cool down the chamber.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination, with the air-heating furnace C and exhaust-fan D, of the air-trunk E and a series of independent drying-chambers, F, connected therewith and with the exhaust-trunk H H′, the said chambers being provided with the valves *b b′*, substantially in the manner and for the purpose set forth.

2. In combination, the valves *b b′*, arranged to cover the openings *a a′*, as described, the valve-stem *e*, and rod *d*, constructed and arranged substantially as described and shown.

3. The combination, with the exhaust-trunk H′ and hot-air trunk E, of the self-acting valve I, as and for the purpose set forth.

4. The combination of the valve D^2 in the blast-pipe D^1, the exhaust-fan D, the exhaust-trunk H′, and the furnace C, constructed and arranged substantially as described and shown.

EDGAR A. JONES.
CHARLES W. JONES.

Witnesses:
H. S. SPRAGUE,
W. W. SPRAGUE.

751 (Defendants' Exhibit P, Letters Patent No. 272,
A. H. Morgan, February 20, 1883.)

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EDGAR A. JONES.
CHARLES W. JONES.

Witnesses:
H. S. SPRAGUE,
W. W. SPRAGUE.

751 (Defendants' Exhibit P, Letters Patent No. 272,744 to A. H. Morgan, February 20, 1883.)

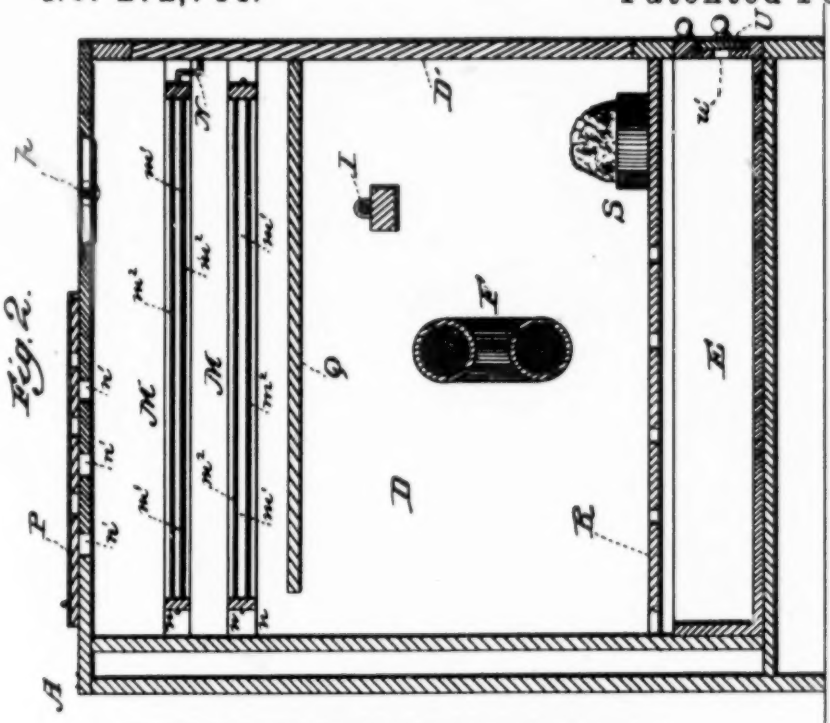
604 (No Model.) 2 Sheets—Sheet 1.

A. H. MORGAN.

INCUBATOR.

No. 272,744. Patented Feb. 20, 1883.

Fig. 2.



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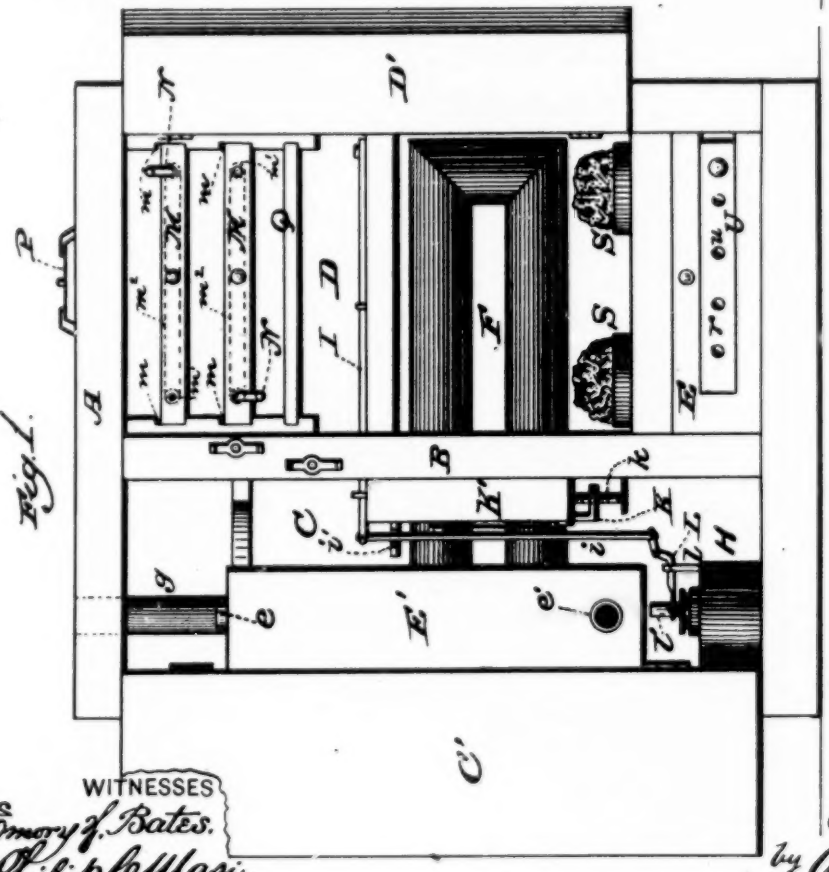


WITNESSES

Emory F. Bates.

Philip C. Masi.

INVENTOR

A. H. Morgan.

by Anderson & Smith

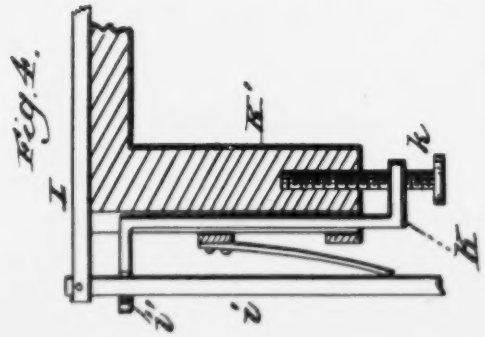
his ATTORNEYS

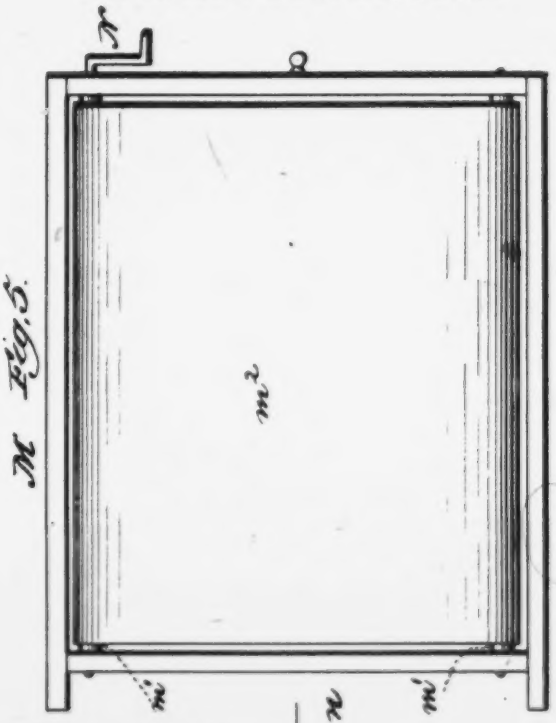
606 (No Model.) 2 Sheets—Sheet 2.

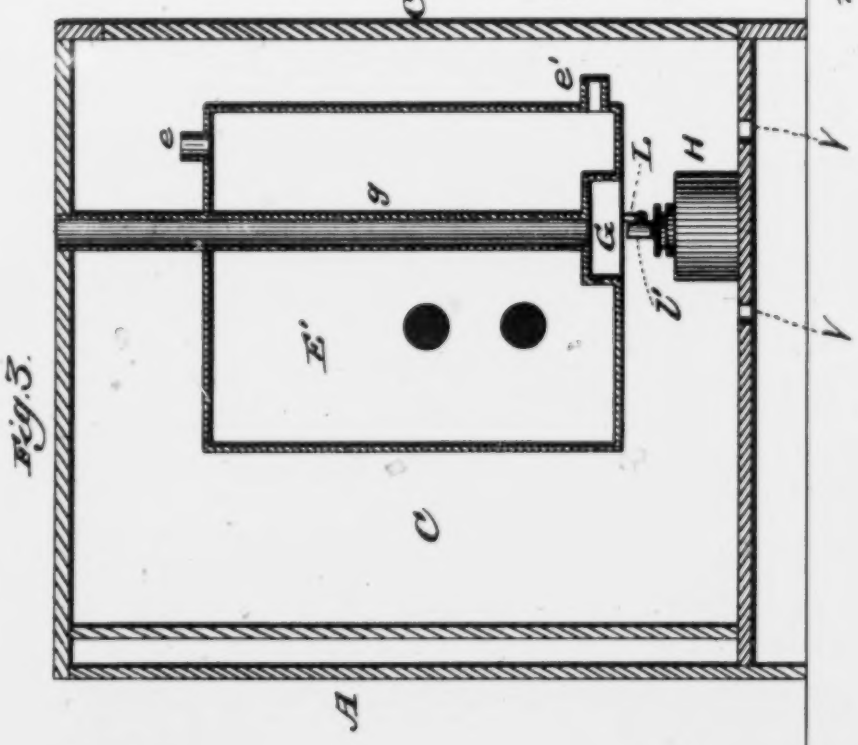
A. H. MORGAN.

INCUBATOR.

No. 272,744. Patented Feb. 20, 1883.







WITNESSES

Emory F. Bates.
Philip C. Masi.

INVENTOR

A. H. Morgan
by Anderson & Smith
his ATTORNEYS

UNITED STATES PATENT

ALBERT H. MORGAN, OF CRESTON, IOWA, ASSIGNOR O
JOSEPH E. BOYELS AND WILLIAM F. MORGAN, OF

INCUBATOR.

SPECIFICATION forming part of Letters Patent No. 272,744, da

Application filed July 8, 1882. (No model.)

To all whom it may concern:

Be it known that I, ALBERT H. MORGAN, a citizen of the United States, and a resident of Creston, in the county of Union and State of Iowa, have invented a new and valuable Improvement in Incubators; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 of the drawings is a front view of my incubator with the doors open. Fig. 2 is a cross-sectional view of the same, taken through the hatching-chamber D. Fig. 3 is also a cross-section, taken through the reservoir and chamber C. Fig. 4 is a detail view of the parts K′ K enlarged, and Fig. 5 is a plan view of one of the shelves.

This invention has relation to incubators; and it consists in the construction and novel arrangement of parts, as will be hereinafter fully described, and particularly pointed out in the claims appended.

The casing A is made double-walled, so as to leave an air-space between its walls, and it is divided by a vertical partition, B, into two general compartments, one of which, C, contains the water-reservoir and lamp and a portion of the temperature-regulating mechanism, while the remaining compartment, D, constitutes the incubating-chamber, which latter is subdivided near its bottom, so as to afford a compartment for the drawer E, in which latter the chickens can be placed as soon as hatched. The lamp and water-reservoir chamber C is closed by a door, C′, and the incubating-chamber D is closed by a separate door, D′.

The heating apparatus consists of a reservoir or receptacle, E′, for water, provided at the top with an inlet, *e*, and at one side, near its bottom, with an outlet, *e′*. The water-pipe F, for heating the incubating chamber, leads from the water-receptacle into the said chamber and then returns to the water-receptacle, so that a constant circulation of heated water will be maintained through the pipe. The casing of this water-receptacle has in its bottom a small recess or chamber, G, from which

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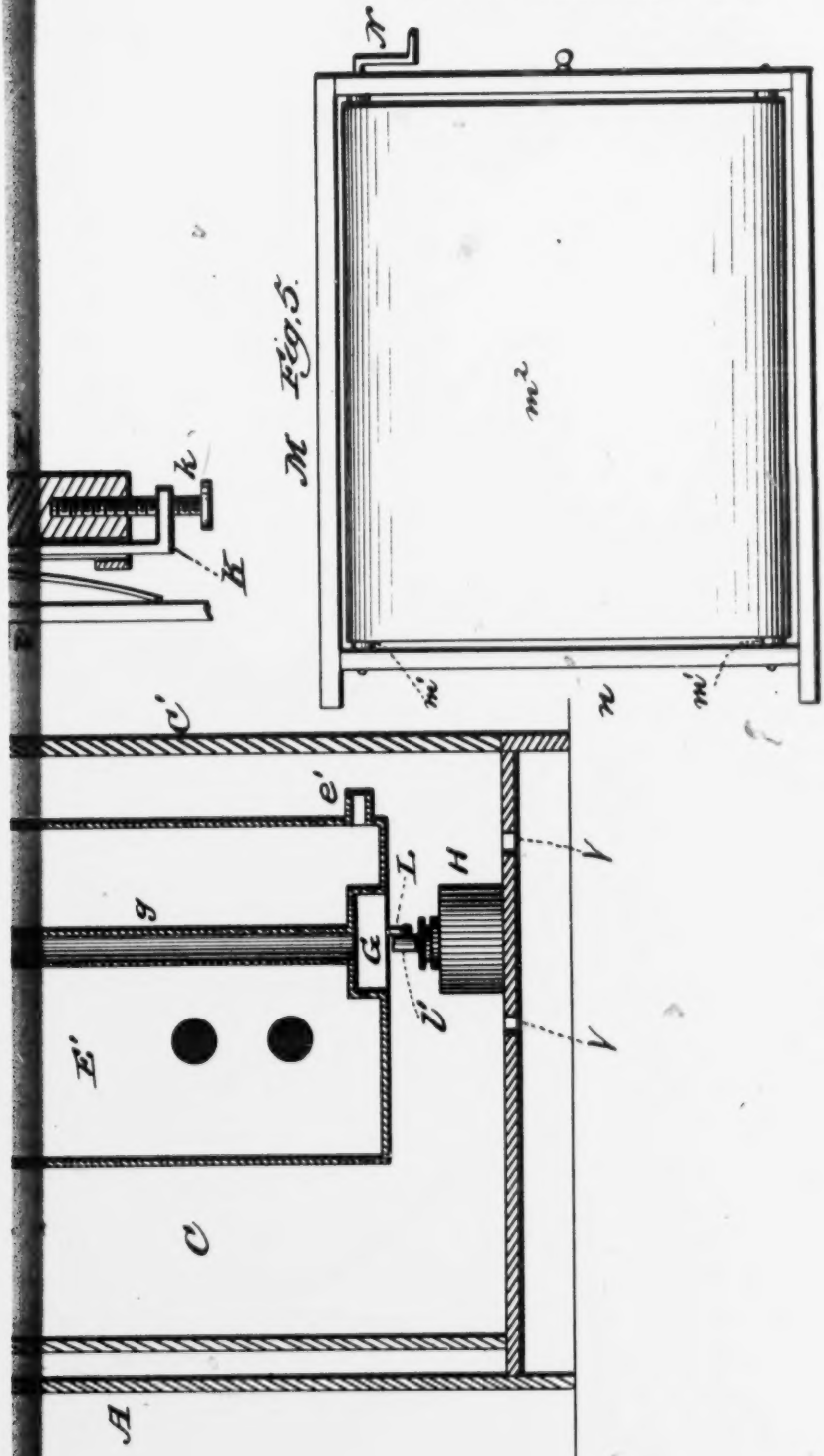
2 Sheets—Sheet 2.

A. H. MORGAN.

INCUBATOR.

Patented Feb. 20, 1883.



INVENTOR
A. H. Morgan
by Anderson & Smith
his ATTORNEYS

UNITED STATES PATENT OFFICE.

ALBERT H. MORGAN, OF CRESTON, IOWA, ASSIGNOR OF TWO-THIRDS TO JOSEPH E. BOYELS AND WILLIAM F. MORGAN, OF SAME PLACE.

INCUBATOR.

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I indicates a copper rod, maintained by staples on a horizontal bar within the incubating-chamber, and secured at one of its ends therein. The remaining end of the rod passes through a slot in the vertical partition, and is jointed to the upper end of a vertical rod within the lamp and water-reservoir chamber. This steel rod *i* passes through the horizontal notched plate or arm *i′* of a vertically-adjustable slide, K, and is jointed at its lower end to a lever, L, which is fulcrumed upon a standard, *l*, rising from the lamp. This lever is in turn connected with a sliding sleeve, *l′*, upon the wick-tube. Excess of heat within the incubating-chamber causes the copper rod to expand, and hence as it is projected farther into the lamp-chamber by reason of such expansion it will cause rod *i* to move about the fulcrum or arm *i′*, and hence operate lever *l* and raise the slide on the wick-tube, so as to lessen the flame, and thus allow the water-receptacle to cool to the required extent. The slide K is supported by a block, K′, and adjusted by a set-screw, *k*, whereby by raising or lowering the slide and its notched arm, which constitutes a fulcral bearing for the steel rod, the throw of the latter can be regulated. The shelves M, for supporting the eggs, slide in the ways *m*, and are each composed of a rectangular frame carrying two rollers, *m′*, upon which is stretched an endless apron, *m²*, of suitable fabric. One of each pair of rollers is provided with a crank, N, by means of which it can be turned so as to move the belt or apron, and thereby turn the eggs supported on the latter. Suitable spaces, *n*, will be left between the ends of the shelves and the casing for the upward circulation of air, and in the casing, above the series of aprons, is a vent-hole, *n′*, which can be closed by a pivoted slide, P. A thermometer, *p*, is arranged in an opening in the casing, above the incubating chamber, so as to indicate the temperature, said opening being closely covered by glass.

Below the lowest egg-shelf is a horizontal sliding partition, Q, which prevents the hot air radiated from the heating-pipe from ascending and impinging directly on said lower shelf. This portion is narrower than the space between the back of the casing and the door of the incubating chamber, so that passages are left for the upward passage of the heated air, which will pass upward and be evenly distributed over the several shelves. Below the pipes in the incubating-chamber is a horizontal perforated partition, R, which supports one or more sponge cups or holders, S. Moist sponges placed in these cups will absorb such impurities in the air as do not escape through the vent-hole in the top of the casing. In practice these sponges should be cleansed every day, and then placed in their holders in a moist condition.

Below the partition R is a drawer, E, in which the chickens can be placed as soon as hatched. Warm air enters this drawer through the perforations in partition R, and fresh air can be supplied to the drawer through a perforated slide, *r*, fitted in the front of the latter, when the perforations in said slide register with like perforations in the front side of the drawer.

U indicates said slide, having a line of perforations, *u*, and *u'* indicate the perforations in the drawer. Air thus entering the drawer will also pass up through the perforated partition R.

Perforations V are formed through the bottom of the lamp-chamber, so as to admit air to support combustion, and an opening can, if desired, be also formed through the top of said chamber. The casing and other supplemental parts of the structure are preferably made of wood, and the same will present a neat and attractive appearance.

The dimensions are left to the option of the manufacturer, and, if desired, several sets of shelves can be employed, with a single drawer under all of said sets.

The form of lamp can be varied and a round or flat wick-tube employed, and the lever connected with the sleeve can be pivoted to any appropriate part of the burner—as, for example, to the rim when a base-burner is used; also, if the apparatus is made on a large scale, several lamps and mechanisms for adjusting their sleeves could be employed.

Having thus described my invention, what I claim is—

1. The combination, with the shelves M, located within the incubating-chamber, of the partition Q, located below the lowest shelf, air-passages at the sides of said partition, and means for supplying heat below said partition, substantially as described.

2. The combination, with the incubating-chamber, of the perforated partition R for supporting sponge-cups, and the drawer located below said partition, substantially as described.

3. The drawer E, located below the incubating-chamber, and provided with perforations in its front, in combination with the slide *r*, provided with like perforations, substantially as described.

In testimony that I claim the above I have hereunto subscribed my name in the presence of two witnesses.

ALBERT HARDING MORGAN.

Witnesses:

GEO. W. DEVOE,

J. W. SCOTT.

757 (Defendants' Exhibit P, Letters Patent No. 286,
C. F. Winkler, October 16, 1883.)

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ALBERT HARDING MORGAN.

Witnesses:

GEO. W. DEVOE,

J. W. SCOTT.

757 (Defendants' Exhibit P, Letters Patent No. 286,756 to C. F. Winkler, October 16, 1883.)

610

(No Model.) 3 Sheets—Sheet 3.

C. F. WINKLER.

INCUBATOR.

No. 286,756. Patented Oct. 16, 1883.

Fig. 4.

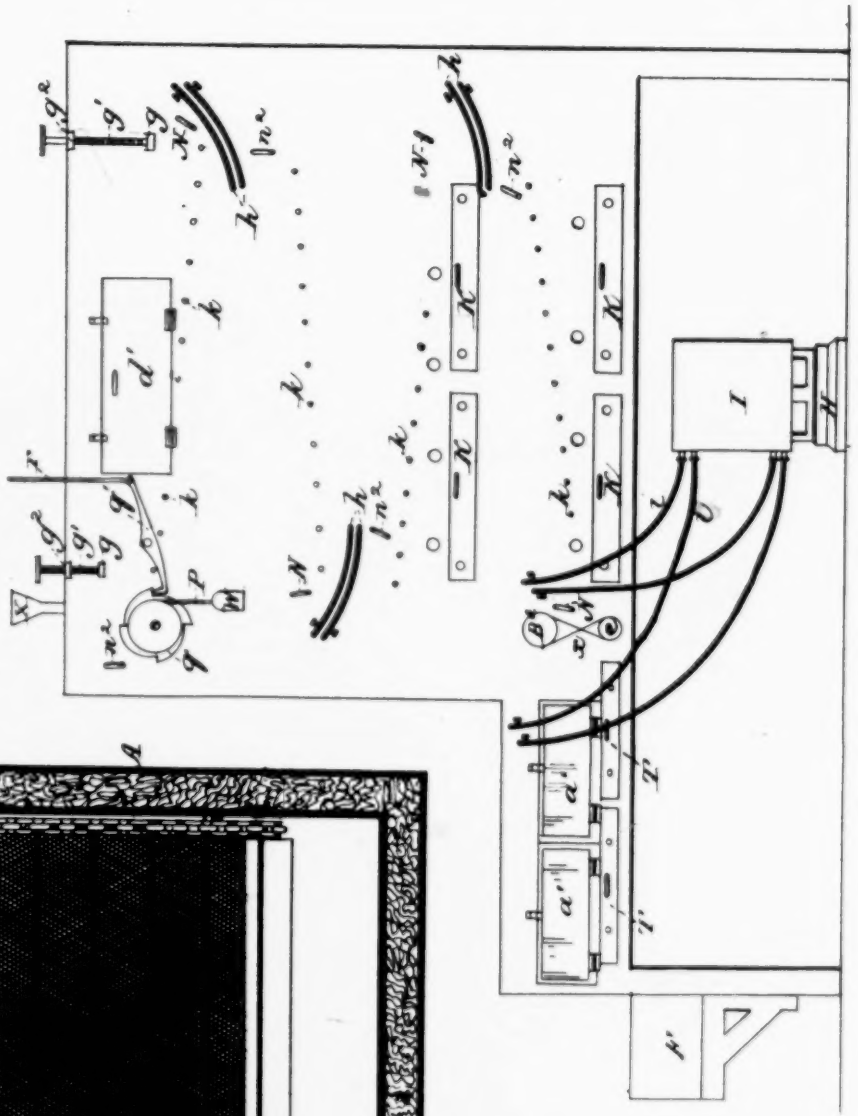
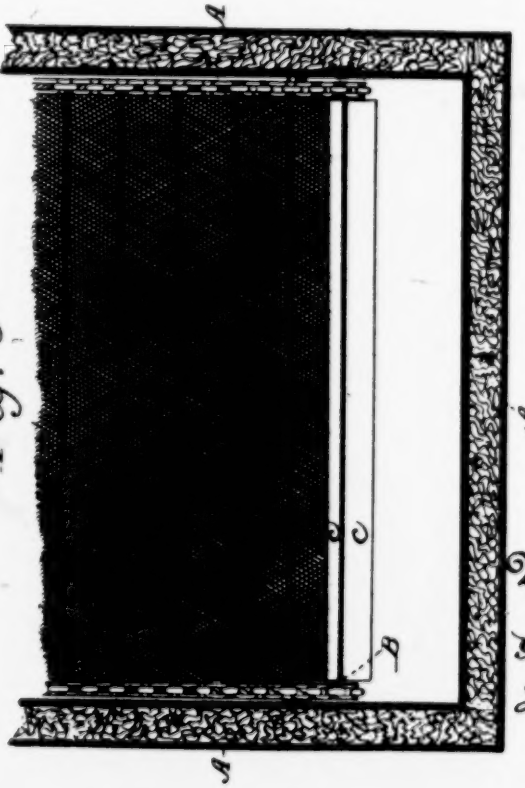


Fig. 5



Witnesses, Inventor
C. F. Winkler
Geo. H. Strong
Lawrence Dewey & Co.
Attorneys

612 (No Model.) 3 Sheets—Sheet 2.

C. F. WINKLER.

INCUBATOR.

No. 286,756. Patented Oct. 16, 1883.

Fig. 3.

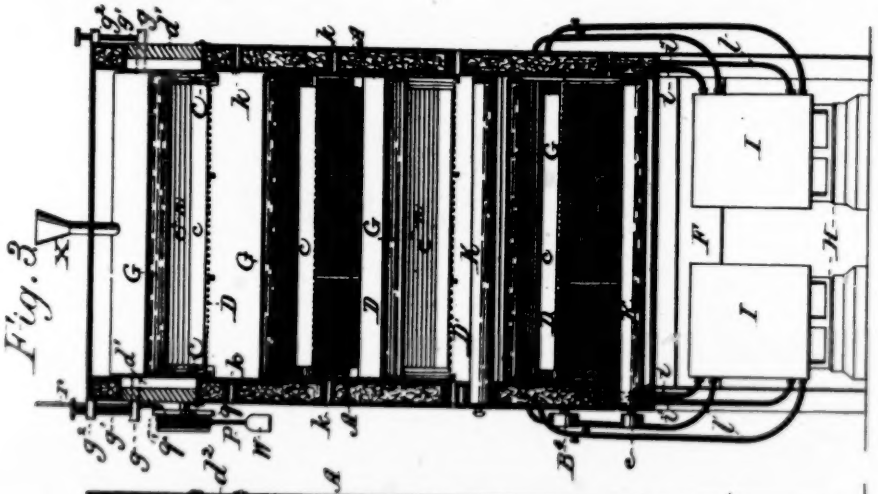
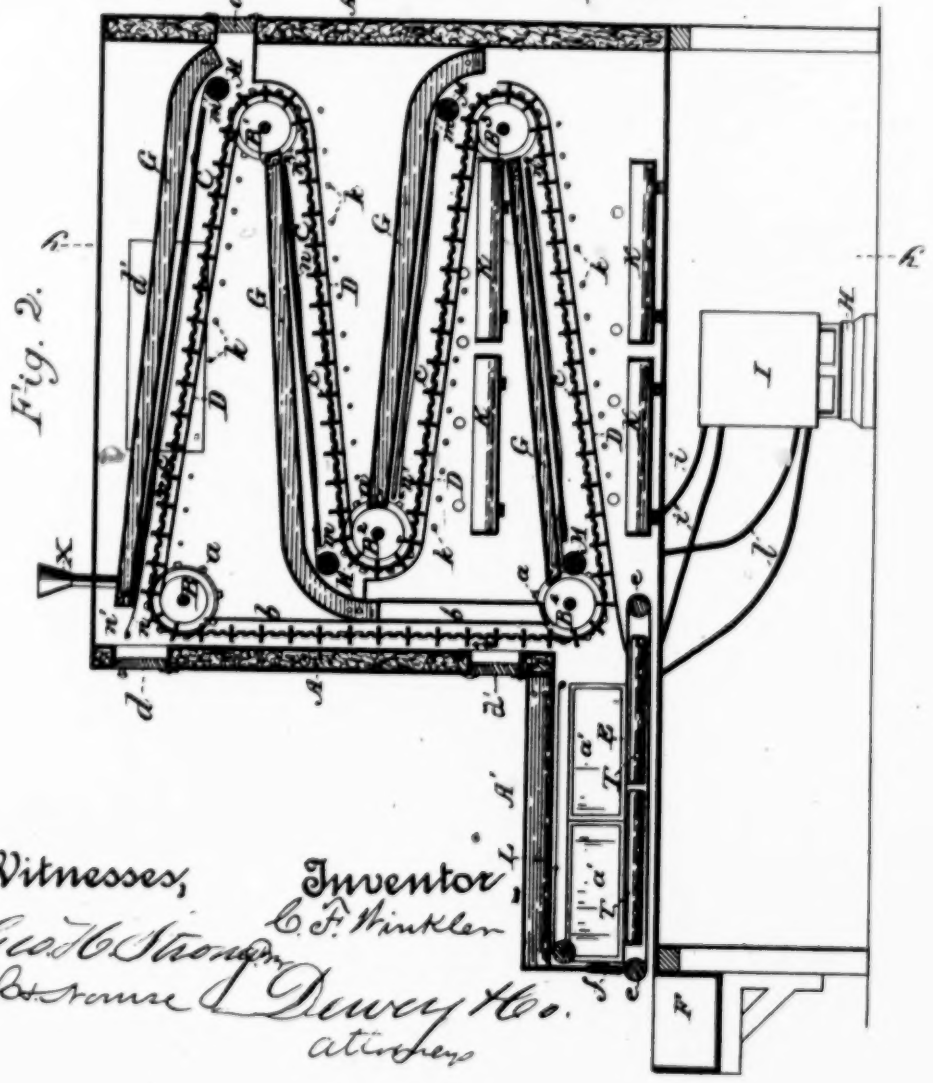


Fig. 2.



Witnesses,
Geo. H. Strong
Jas. Shearman

Inventor,
C. F. Winkler
Dewey & Co.
attorneys

614

(No Model.) 3 Sheets—Sheet 1.

C. F. WINKLER.

INCUBATOR.

No. 286,756. Patented Oct. 16, 1883.

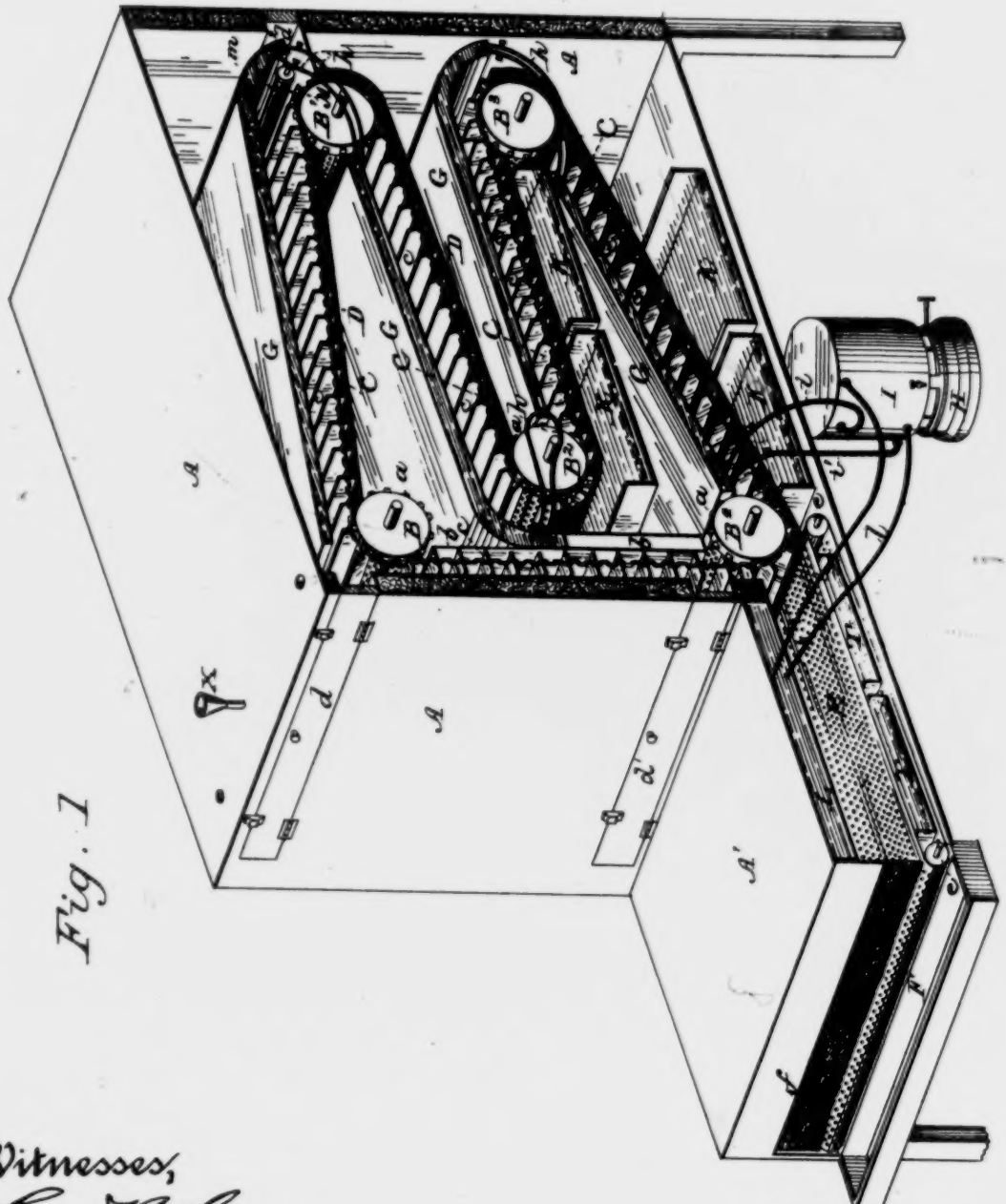


Fig. 1

Witnesses,
Geo. H. Strong.
J. H. Munn

Inventor,
C. F. Winkler
by Dewey & Co.
Attorneys

UNITED STATES PATENT

CHARLES F. WINKLER, OF BAKERSFIELD, CA

INCUBATOR.

SPECIFICATION forming part of Letters Patent No. 288,756; d

Application filed May 17, 188 (No model.)

To all whom it may concern:

Be it known that I, CHARLES F. WINKLER, of Bakersfield, county of Kern, State of California, have invented an Improvement in an Incubator; and I hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to certain new and useful improvements in the class of incubators employing an endless traveling conveyer for receiving and advancing the eggs; and the invention consists in novel features of construction and combination of parts, all as will be hereinafter fully described, and set forth in the claims hereto annexed.

The object I have in view in this invention is to overcome certain patent difficulties which attend the operation of machines now in use. A brief recital of these will serve to explain more clearly my object. During the progress of incubation the temperature must vary. At the beginning the eggs require a greater heat than at the close, because toward the end the embryo, having increased, furnishes a certain amount of heat for itself. For this reason the temperature produced by the apparatus should be gradually decreased during the process. This necessitates the complete charging of the incubator at the start. One lot of eggs cannot be introduced to-day and another in a week, because the temperature would be unsuitable for either one lot or the other. In large machines this immediate and large collection of eggs presents the difficulty of getting them fresh enough, or requires an outlay of money. My machine is so constructed as to allow the introduction of a fresh lot of eggs at short intervals, and gives to each lot its own required temperature. This enables me to use successively perfectly fresh eggs without trouble, and makes the process continuous, which is a very desirable result in poultry-raising. Again, when all the eggs have reached an equal stage, and the young begin to come out, they are all crowded in the same apartment, or many are in several chambers. They hatch practically simultaneously, so that a great many are always wet. This necessitates the constant opening of the

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C. F. WINKLER.

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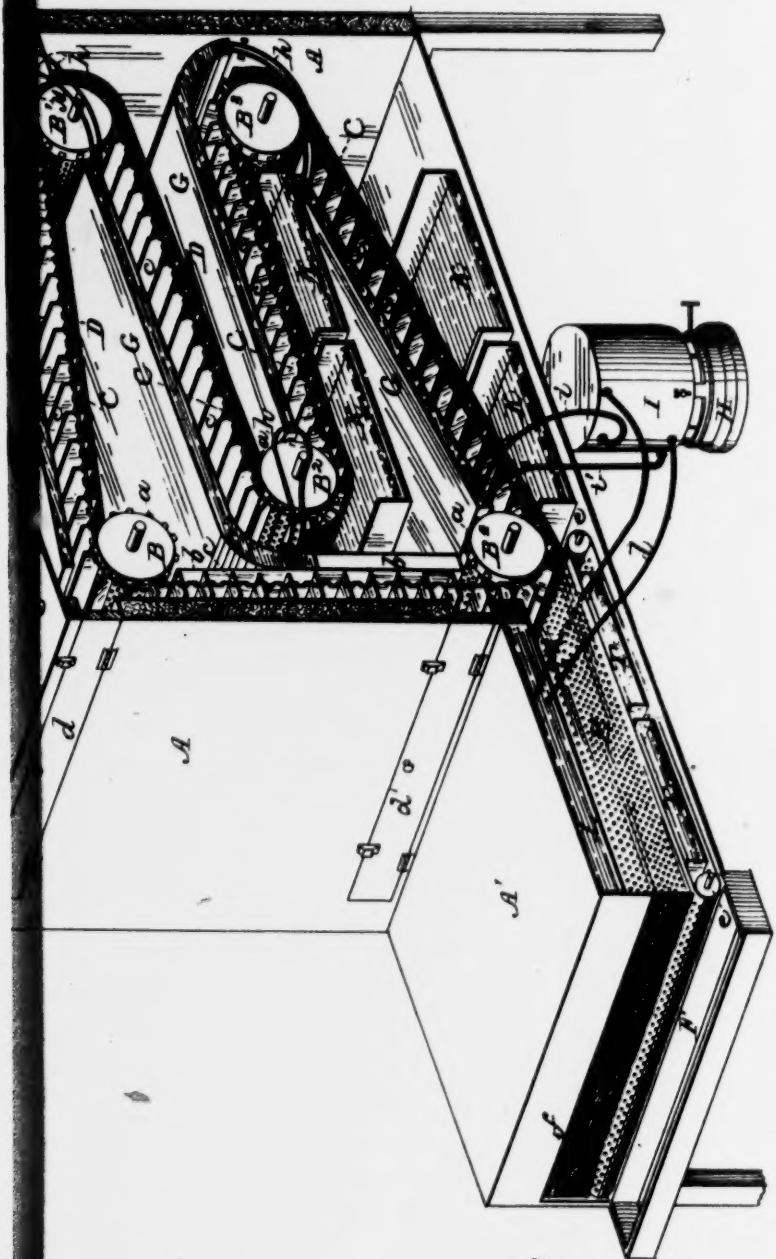
Patented Oct. 16, 1883.



Inventor,
C. F. Winkler
by Dewey & Co.
Attorneys

UNITED STATES PATENT OFFICE.

CHARLES F. WINKLER, OF BAKERSFIELD, CALIFORNIA

INCUBATOR.

SPECIFICATION forming part of Letters Patent No. 286,756; dated October 16, 1883.

Application filed May 17, 1883. (No model.)

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Figure 1, Sheet 1, is a perspective view of my machine, having one of its sides removed to show the interior. Fig. 2, Sheet 2, is a vertical longitudinal section of same. Fig. 3 is a cross-section on line *y y*, Fig. 2. Fig. 4, Sheet 3, is a side elevation of same. Fig. 5 is a portion of a plan, showing the conveyer.

A is the casing of the machine, having double-spaced walls filled with some non-conducting material.

B is a hollow drum perforated over its surface, and mounted transversely in the sides of the machine near its top at one end. B' is a similar drum, mounted in the other end and a little lower down. B^2 is a drum mounted in the first end, lower down and a little farther in. B^3 is a drum at the other end, and B^4 a drum at the bottom in the first end.

C C are endless chains passing over the ends of the drums, and following a course from B down to and around B', to and around B^2, to and around B^3, to and around B^4, and up vertically behind an inner wall *b*, to the point of beginning. The ends of the drums are provided with teeth or pins *a*, similar to a sprocket-pulley, for engaging with the links of the chains and insuring a positive motion there-

for. On account of the position of the drums the course of the chains is inclined downwardly to drum B'. Secured at short intervals in the chains are the tranverse slats *c*, which form a conveyer, as I shall explain. These slats are secured to the chains at the middle line of their ends, thus making half the width of the slat below and half above the chains, for the reason that in turning around the drums they become reversed edge for edge. These slats travel over flooring D. This may consist of any perforated material, wire screen being preferable, to permit ventilation. This flooring is in sections, the uppermost piece lying between the drums B B', the next between drums B' B², and so on down. The top section is straight; but the others are bent around the upper drum of each, following its curvature to a point above its center, in order to receive and guard the eggs when traveling around the drum, and to keep them to their places between the slats. The lowest of these flooring-sections opens down upon an endless perforated belt or carrier, E, placed in a horizontal plane, and traveling over rollers *e* within an extension, A', of the main casing A.

I shall now explain the operation and advantages of the devices as far as described.

In one end of the machine, at its top, is a door, *d*, another, *d'*, in its sides, below the former, and another, *d²*, in its other end. The conveyer, consisting of the chains and slats, travels downward at certain times by means which I shall hereinafter describe. The length of the belt and the distances of its periodical progression are so regulated that from the point where a slat, *c*, passes the door *d'* to the point where it turns and begins to ascend will be about nineteen days. This period covers the time during which it is found necessary to turn chicken-eggs. From the point where the conveyer passes the door *d'* to the lowest point, the period is from twenty-five to twenty-eight days, and from the very top at door *d* to to bottom it is about thirty days. These periods cover the time necessary for turning other than chicken-eggs. The eggs are placed between the slats *c* and rest upon the floors D. The chicken-eggs are placed into the conveyer through the door *d²*, the duck and turkey eggs through the door *d'*, and the goose-eggs through door *d*. Knowing the times at which the conveyer is advanced its set distance, I am ready with a fresh lot of eggs to put through the doors into the slats which are within reach. At the next time, these eggs have been carried forward and empty slats presented, into which I put another lot, and so on. In this way I put in, at short intervals, a limited number. The eggs being discharged below, the slats ascend empty, and the operation is continuous. The turning of the eggs is entirely automatic, for the reason that they rest on a stationary downwardly-inclined floor, and are advanced by the traveling slats, between which they lie. They thus roll, and the distance which the conveyer advances at one time is regulated to turn them a quarter or a half a turn, as the case may be. The curved ends of the floor-sections D receive the eggs as they come around the drums. When they reach the bottom the chicks will have picked the shells, and the eggs must not thereafter be turned. This is the object of the horizontal traveling carrier E. This carrier is advanced at intervals at such a rate that it may take, say, about three days to reach the end. The eggs do not roll on the carrier, but are advanced. The chicks come out, and are removed through side doors, *a'*, while the shells and bad eggs continue, and are discharged through the open end of the extension A' into a receptacle, F. The end of the extension is preferably covered by a fringe, *f*. It will be observed that the place in which the chicks are hatched is sufficient in area not to be crowded, thereby giving the chicks a fair chance, and they are sufficiently removed from the other eggs yet in process to prevent injury to them.

I shall now describe the means by which I obtain the desired temperature.

Over the conveyer, above all its folds and following its inclination, are the sections of water-jacket G. These are independent of each other, and are suspended at their ends by means of blocks *g*, projecting through slots in the casing A, and the screws *g'*, attached at their lower ends to the blocks *g*, and passing vertically through suitable holes in the blocks *g²*, Fig. 4. By turning these screws each section of water-jacket may be raised or lowered independently. The ends of these sections are curved, where necessary, to follow the course of the conveyer, and they are preferably tapered to their upper ends, in order to reduce their thickness and provide for a greater vertical play in small space. The ends of the sections of water-jacket G are connected with each other by two flexible pipes, *h*. Of these, one joins the bottoms of the jackets and the other the tops, whereby the free circulation of the hot and cold water is permitted. Under the machine are the coal-oil stoves H, having the boilers I. From the tops of these boilers extend flexible pipes *i* to the upper portion of the lower end of the lowest section of water-jacket G. Flexible pipes *i'* join the bottom of the boilers with the lower portion of said sections. These connecting-pipes, being flexible, permit the adjustment of each section of water-jacket. It is through the means of this adjustment that I obtain the required heat for all stages of the operation. As hot water goes to the top, it will be found that the uppermost water-jacket will be the hottest, and so on down, and as greater heat is required at the beginning of the process, this is the suitable condition. After the machine has been set up and tested, it will readily be seen what difference in temperature exists between each of the sections. Then by vertically adjusting the water-sections they may be brought in closer prox-

imity to or farther from the eggs, in order to give them the heat required at whatever stage of the process they may be. In like manner, the adjustment of one end of a section will provide for any change in temperature which may be required in the extent of one fold of the conveyer.

X is the funnel, through which the water-jacket and boilers are filled. Small holes *k* through the sides of the casing A provide for the admission of fresh air under the perforated floor-sections. Under the lower two floor-sections I have the water-trays K, to provide moisture during the later stages of the process, when it is most needed. Over the horizontal carrier E, I have a separate water-jacket, L, which is connected with the top and bottom of boiler by pipes *l*. The heat of this is regulated to give the required temperature during the very latest stages of incubation.

The eggs require to be cooled about once a day. This I do by the following means: Mounted transversely in the casing over the bends or turns in the conveyer, and between it and the water-jackets, are rollers M, upon which are wound curtains *m*, of some kind of cloth or fabric. With the edges of these are connected strings *n*, which extend over the conveyer, and are wound on a shaft, *n'*, having crank *n²*. By winding these strings the curtains are unwound and lie over the eggs, shielding them from the heat. When sufficiently cool, they are wound back upon their rollers. This is done by small cranks N on their ends, though I may provide them with springs to operate automatically, as ordinary window-curtains work.

In Fig. 4 I show a portion of the means by which I cause the periodical advancement of the conveyer. The end of drum B, or a gudgeon thereon, projects through the side of the casing, and has a cord, P, wound thereon. This cord suspends a weight, W, which is sufficient, with the weight of the conveyer and its eggs, to cause said conveyer to advance with a positive motion. Upon the drum is a ratchet, *q*, with which a pivoted latch, *q'*, engages. The outer arm of this latch is heavy enough to cause its point to engage with the ratchet and hold the drum stationary. The end of the latch is connected by a rod, *r*, with clock-work, which I have not deemed it necessary to show here. At stated periods—say every six hours—the clock-work raises rod *r*, withdrawing the latch from the ratchet momentarily. The drum then turns, advancing the conveyer. The rod is immediately relieved, and the latch drops back to engage with the next tooth of the ratchet and stop the conveyer. By regulating the diameter of this ratchet the advancement of the conveyer is rendered definite. Between the top and bottom of the horizontal carrier E are water-trays T, for supplying moisture. In order to impart a forward motion to the horizontal carrier E, I have the cross-belt *x*, Fig. 4, from the drum B' to one of the rollers *e*.

Having thus descr
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I shall now describe the means by which I obtain the desired temperature.

Over the conveyer, above all its folds and following its inclination, are the sections of water-jacket G. These are independent of each other, and are suspended at their ends by means of blocks *g*, projecting through slots in the casing A, and the screws *g'*, attached at their lower ends to the blocks *g*, and passing vertically through suitable holes in the blocks *g²*, Fig. 4. By turning these screws each section of water-jacket may be raised or lowered independently. The ends of these sections are curved, where necessary, to follow the course of the conveyer, and they are preferably tapered to their upper ends, in order to reduce their thickness and provide for a greater vertical play in small space. The ends of the sections of water-jacket G are connected with each other by two flexible pipes, *h*. Of these, one joins the bottoms of the jackets and the other the tops, whereby the free circulation of the hot and cold water is permitted. Under the machine are the coal-oil stoves H, having the boilers I. From the tops of these boilers extend flexible pipes *i* to the upper portion of the lower end of the lowest section of water-jacket G. Flexible pipes *i'* join the bottom of the boilers with the lower portion of said sections. These connecting-pipes, being flexible, permit the adjustment of each section of water-jacket. It is through the means of this adjustment that I obtain the required heat for all stages of the operation. As hot water goes to the top, it will be found that the uppermost water-jacket will be the hottest, and so on down, and as greater heat is required at the beginning of the process, this is the suitable condition. After the machine has been set up and tested, it will readily be seen what difference in temperature exists between each of the sections. Then by vertically adjusting the water-sections they may be brought in closer prox-

imity to or farther from the eggs, in order to give them the heat required at whatever stage of the process they may be. In like manner, the adjustment of one end of a section will provide for any change in temperature which may be required in the extent of one fold of the conveyer.

X is the funnel, through which the water-jacket and boilers are filled. Small holes *k* through the sides of the casing A provide for the admission of fresh air under the perforated floor-sections. Under the lower two floor-sections I have the water-trays K, to provide moisture during the later stages of the process, when it is most needed. Over the horizontal carrier E, I have a separate water-jacket, L, which is connected with the top and bottom of boiler by pipes *l*. The heat of this is regulated to give the required temperature during the very latest stages of incubation.

The eggs require to be cooled about once a day. This I do by the following means: Mounted transversely in the casing over the bends or turns in the conveyer, and between it and the water-jackets, are rollers M, upon which are wound curtains *m*, of some kind of cloth or fabric. With the edges of these are connected strings *n*, which extend over the conveyer, and are wound on a shaft, *n'*, having crank *n²*. By winding these strings the curtains are unwound and lie over the eggs, shielding them from the heat. When sufficiently cool, they are wound back upon their rollers. This is done by small cranks N on their ends, though I may provide them with springs to operate automatically, as ordinary window-curtains work.

In Fig. 4 I show a portion of the means by which I cause the periodic advancement of the conveyer. The end of drum B, or a gudgeon thereon, projects through the side of the casing, and has a cord, P, wound thereon. This cord suspends a weight, W, which is sufficient, with the weight of the conveyer and its eggs, to cause said conveyer to advance with a positive motion. Upon the drum is a ratchet, *q*, with which a pivoted latch, *q'*, engages. The outer arm of this latch is heavy enough to cause its point to engage with the ratchet and hold the drum stationary. The end of the latch is connected by a rod, *r*, with clock-work, which I have not deemed it necessary to show here. At stated periods—say every six hours—the clock-work raises rod *r*, withdrawing the latch from the ratchet momentarily. The drum then turns, advancing the conveyer. The rod is immediately relieved, and the latch drops back to engage with the next tooth of the ratchet and stop the conveyer. By regulating the diameter of this ratchet the advancement of the conveyer is rendered definite. Between the top and bottom of the horizontal carrier E are water-trays T, for supplying moisture. In order to impart a forward motion to the horizontal carrier E, I have the cross-belt *x*, Fig. 4, from the drum B' to one of the rollers *e*.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an incubator, a conveyer for receiving the eggs, and means for advancing said conveyer periodically, in combination with heating devices arranged to give the heat requisite at all points during the progress of the eggs, substantially as and for the purposes herein described.

2. In an incubator, a conveyer for receiving the eggs, consisting of spaced slats, between which the eggs lie, and means for advancing it, in combination with an inclined floor, down which the conveyer travels and upon which the eggs rest, whereby they turn with the advancement of the conveyer and their own progress, substantially as and for the purposes herein described.

3. In an incubator, the drums B, B', B², B³, and B⁴, having teeth *a*, the endless chain C C, having spaced cross-slats *c*, and a means for advancing said chains and slats, in combination with the perforated floor-sections D, over which the slats travel, substantially as and for the purpose herein described.

4. In an incubator, the hollow perforated drums B, B', B², B³, and B⁴, having teeth *a*, the endless chains C C, having spaced cross-slats *c*, and a means for advancing said chains and slats, in combination with the perforated floor-sections D, having their upper ends concentric with the drums for a short distance, substantially as and for the purpose herein described.

5. In an incubator, the casing A, having doors *d d' d²*, in combination with the endless egg-conveyer consisting of the endless chains C C and cross-slats *c*, passing said doors, and a means for advancing said conveyer, substantially as and for the purpose herein described.

6. In an incubator, the drums B B' B² B³ B⁴, the endless chains C C and spaced slats *c*, and means for advancing said chains and slats, and the perforated floor-sections D, in combination with the water-jackets G, placed over the slats, and means for heating the water therein, substantially as and for the purpose herein described.

7. In an incubator, the drums B B' B² B³ B⁴, the endless chains C C and spaced slats *c*, and means for advancing said chains and slats, and the perforated floor sections D, in combination with the superposed sections of water-jacket G, means for heating the water therein, and means for adjusting them vertically, substantially as and for the purpose herein described.

8. In an incubator, the tortuous conveyer consisting of the endless chains C C and cross-slats *c*, and means for advancing it, and the perforated floor-sections D, in combination with superposed sections of water-jacket G, means for vertically adjusting them independently, the flexible connecting-pipes *h*, the boilers I, and flexible connecting-pipes *i i'*, sub-

stantially as and for the purpose herein described.

9. In an incubator, the tortuous conveyer, as herein described, and means for advancing it, in combination with the horizontal endless carrier E and means for actuating it, substantially as and for the purpose herein described.

10. In an incubator, the tortuous conveyer consisting of the endless chains C C and spaced cross-slats *c*, and means for advancing it, and the downwardly-inclined floor-sections D, upon which the eggs roll, in combination with the horizontal endless carrier E and means for actuating it, substantially as and for the purpose herein described.

11. In an incubator, the tortuous traveling conveyer, as herein described, in combination with the endless traveling carrier E, the superposed water-jacket L, the boilers I, and connecting-pipes *l*, substantially as and for the purpose herein described.

12. In an incubator, the traveling conveyer, as herein described, and the superposed sections of water-jacket G, in combination with the intervening curtains, *m*, substantially as and for the purpose herein described.

13. In an incubator, the traveling conveyer, as herein described, and the superposed sections of water-jacket G, in combination with the rollers M, the curtains *m* thereon, and the draw-strings *n*, substantially as and for the purpose herein described.

14. In an incubator, the endless conveyer, as herein described, in combination with the means for advancing it periodically, consisting of the driving-drum B, the rope P, and weight W, and the holding mechanism consisting of the ratchet *q* and pivoted latch *q'*, which are to be operated by a momentary releasing mechanism, substantially as and for the purpose herein described.

In witness whereof I have hereunto set my hand.

CHARLES F. WINKLER.

Witnesses:
WM. F. BOOTH,
J. H. BLOOD.

767 (Defendants' Exhibit P, Letters Patent No. G. Conant, April 29, 1884.)

and for the purpose herein de-

ncubator, the tortuous conveyer, scribed, and means for advancing nation with the horizontal endless d means for actuating it, substan- l for the purpose herein described.

incubator, the tortuous conveyer f the endless chains C C and spaced , and means for advancing it, and ardly-inclined floor-sections D, the eggs roll, in combination with al endless carrier E and means for substantially as and for the pur- described.

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13. In an incubator, the traveling conveyer, as herein described, and the superposed sections of water-jacket G, in combination with the rollers M, the curtains *m* thereon, and the draw-strings *n*, substantially as and for the purpose herein described.

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CHARLES F. WINKLER.

Witnesses:
WM. F. BOOTH,
J. H. BLOOD.

767 (Defendants' Exhibit P, Letters Patent No. 297,676 to G. Conant, April 29, 1884.)

620

(No Model.)

G. CONANT

DEVICE FOR PRESERVING EGGS.

No. 297,676. Patented Apr. 29, 1884.

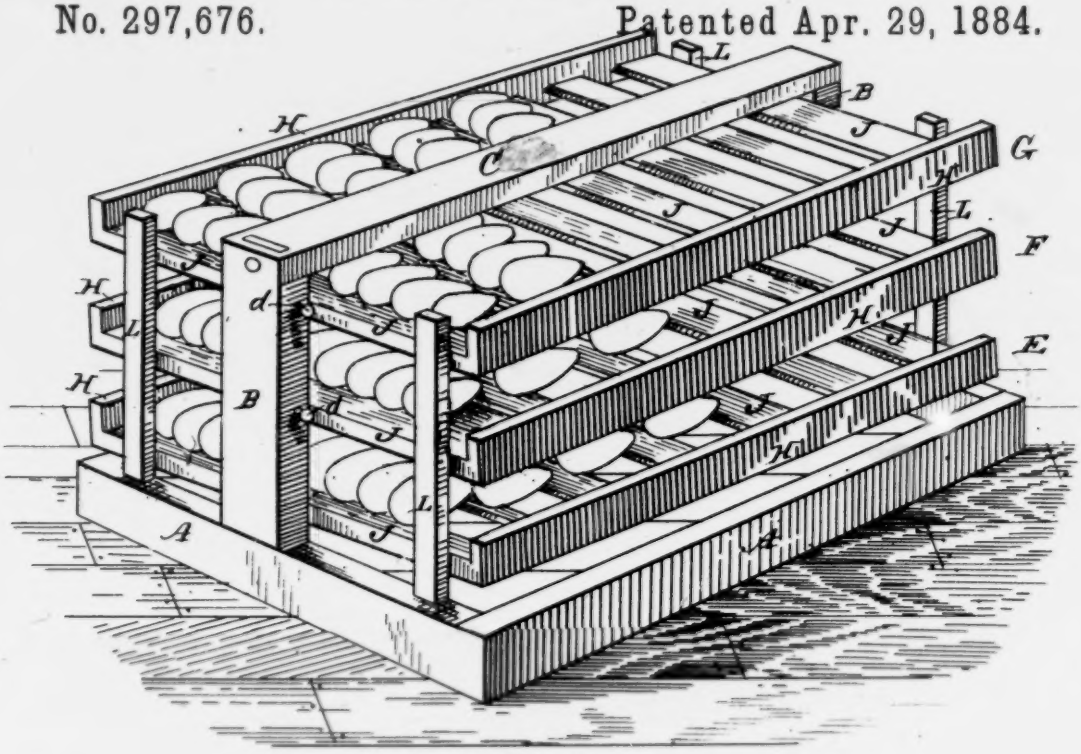

Fig. 1.

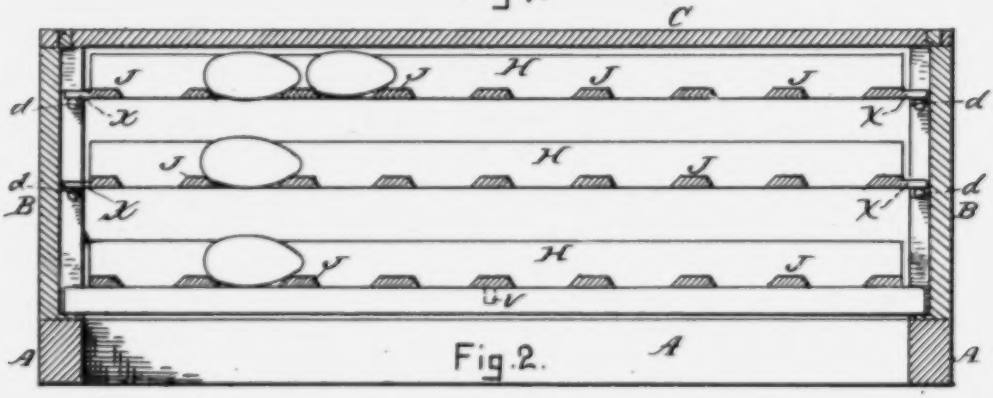

Fig. 2.

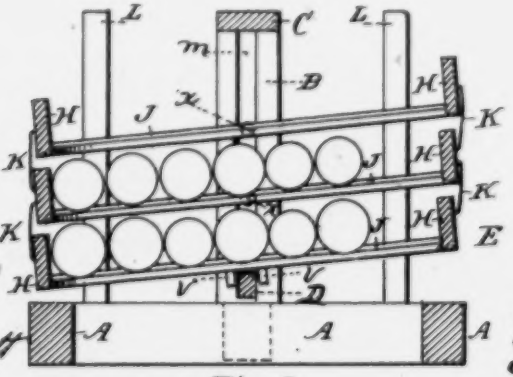

Fig. 3.

Witnesses:
Alfred. Faucett
L. J. White

Inventor:
George Conant,
per C. C. Shaw,
Atty

UNITED STATES PATEN

GEORGE CONANT, OF MARSHFIELD, MAS

DEVICE FOR PRESERVING E

SPECIFICATION forming part of Letters Patent No. 297,6

Application filed October 5, 1883. (No model.)

To all whom it may concern:

Be it known that I, GEORGE CONANT, of Marshfield, in the county of Plymouth, State of Massachusetts, have invented a certain new and useful Improvement on Egg-Preservers, of which the following is a description sufficiently full, clear, and exact to enable any person skilled in the art or science to which said invention appertains to make and use the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is an isometrical perspective view representing my improved egg-preserver in use; Fig. 2, a vertical transverse section taken through the center of the standards, and Fig. 3 a vertical longitudinal section.

Like letters of reference indicate corresponding parts in the different figures of the drawings.

My invention relates to that class of egg-preservers in which the eggs are preserved by mechanical in contradistinction to chemical means; and it consists in a novel construction and arrangement of the parts, as hereinafter more fully set forth and claimed, by which a simpler, cheaper, and more effective device of this character is produced than is now in ordinary use.

The nature and operation of the improvement will be readily understood by all conversant with such matters from the following explanation, its extreme simplicity rendering an elaborate description unnecessary.

In the drawings, A represents the base or bed-piece of the machine, and B the uprights or standards. The standards are framed into the base, and connected at their upper ends by the cross-bar C, each one being provided on its inner face with a vertical longitudinal groove or slot, *m*.

Disposed in the lower part of the machine, between the standards, there is a cross-bar or fulcrum, D, and centrally arranged thereon is a rack, E, provided with downwardly-projecting pins *v*, to prevent it from sliding or moving out of position, but so arranged as to permit the rack to be freely tilted or rocked. This rack consists of the end pieces, H, connected by a series of rails or slats, J, the rails being beveled o
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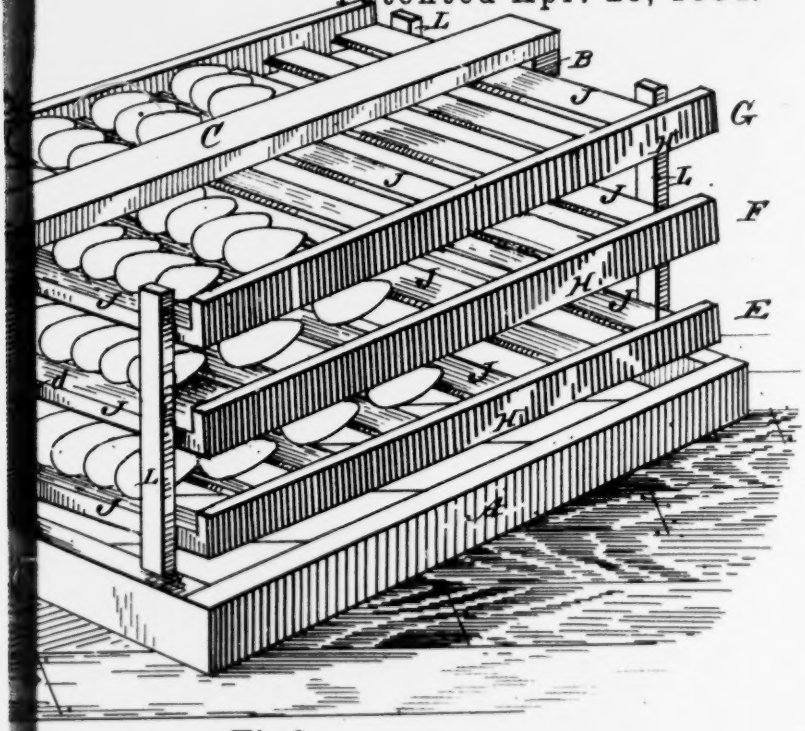
G. CONANT.

DEVICE FOR PRESERVING EGGS.

Patented Apr. 29, 1884.



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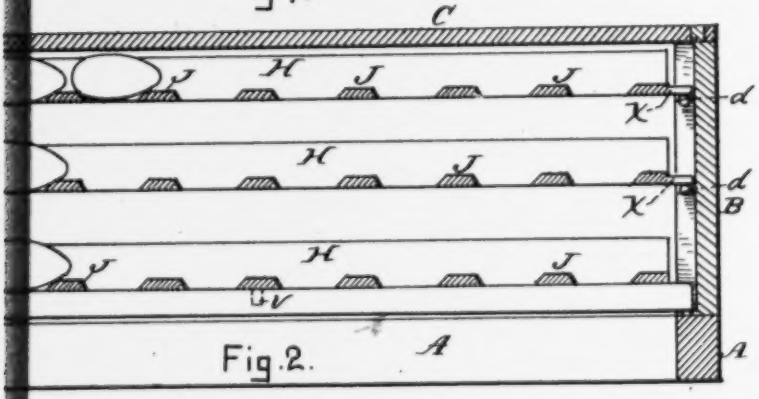

Fig. 2.

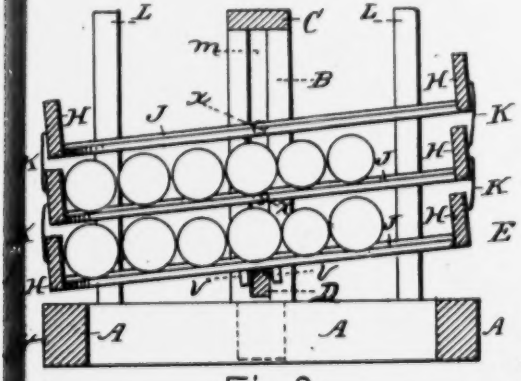

Fig. 3.

Inventor:
George Conant,
per C. C. Shaw,
Atty.

UNITED STATES PATENT OFFICE.

GEORGE CONANT, OF MARSHFIELD, MASSACHUSETTS.

DEVICE FOR PRESERVING EGGS.

SPECIFICATION forming part of Letters Patent No. 297,676, dated April 29, 1884.

Application filed October 5, 1883. (No model.)

To all whom it may concern:

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In the drawings, A represents the base or bed-piece of the machine, and B the uprights or standards. The standards are framed into the base, and connected at their upper ends by the cross-bar C, each one being provided on its inner face with a vertical longitudinal groove or slot, *m*.

Disposed in the lower part of the machine, between the standards, there is a cross-bar or fulcrum, D, and centrally arranged thereon is a rack, E, provided with downwardly-projecting pins *v*, to prevent it from sliding or moving out of position, but so arranged as to permit the rack to be freely tilted or rocked. This rack consists of the end pieces, H, connected by a series of rails or slats, J, the rails being beveled on their upper edges, as best seen in Fig. 2. The end pieces, H, are extended slightly above the rails, to prevent the eggs from rolling from the rack when the rack is tilted.

Two racks, F G, constructed in substantially the same manner as the rack E, are arranged above said last-named rack, their side rails being provided with pins *x*, which project into the slots *m*, and rest upon pins *d*, passing through the standards B, thereby centrally pivoting them and enabling them to be tilted or rocked in the same manner as the rack E. If preferred, all of the racks may be provided with pins *v* and bars D, the ends of the bars entering the slots *m*, and being supported on the pins *d*, or in any other suitable manner. A wire, K, is secured to the end pieces, H, in such a manner as to connect all of the racks, thereby enabling them to be tilted or rocked on their supports conjointly or in unison. It will be understood that the racks are not designed to be rotated or revolved, but simply tilted in either direction at a slight angle to the horizontal. When but one rack is used, the bed-piece A may serve as a stop to arrest the motion of the rack, or any other suitable stop may be employed. When several racks are connected one above another, the means for connecting them will not only cause them to tilt in unison, but will also serve to arrest their motion and hold them at a proper angle of inclination. A vertically-arranged standard L, is also provided at either corner of the bed-piece to assist in keeping the racks in proper position.

In the use of my improvement, the preserver or machine is placed in a cold apartment adapted for the purpose and filled with eggs, the eggs being placed so that they rest upon the contiguous beveled edges of the rails, with their axes at right angles to said rails, the rails being sufficiently near together to prevent the eggs from falling between them, and sufficiently far apart to admit of a circulation of air. When the eggs are placed in the machine in the manner described, they will rest side by side, and be arranged in rows, as best seen in Figs. 1 and 3, the rows being slightly separated, and each of the eggs in any particu-

lar row in contact with the adjoining eggs in the same row. The rows of eggs do not extend the entire distance between the end pieces, H, of the racks, a space being left at one end of each row corresponding as nearly as possible with half the circumference of an ordinary hen's egg, or, say, one and one-half inch, so that when the racks are tilted on their supports all of the eggs in each row will roll toward the lowest side of the rack, each egg performing a half-revolution, thereby being turned completely upside down before the traverse of the eggs is stopped by the lower egg in the row coming into contact with the lower end piece of the rack, it being understood that the racks are to be tilted to turn the eggs once a day, or as often as may be required to properly preserve them.

It will be obvious that when one end of the racks is elevated, as described, and the eggs caused to roll to the opposite side of the machine, the center of gravity in each rack will be thrown outside its center of motion, or between its pivotal support or fulcrum and its lowest end, thereby rendering it unnecessary to fasten the racks to keep them in a proper position after being tilted to turn the eggs.

I do not confine myself to connecting the racks by the wire K, as they may be connected by a rod or rods, or in any other convenient manner. Neither do I confine myself to the use of any special number of racks in a machine, or to beveling the edges of the rails J, or to the use of the standards L, or to constructing the racks of any special size, or to pivoting the racks precisely as described, as they may be supported and pivoted in such a manner as to be readily tilted by any suitable means for that purpose without departing from the spirit of my improvement.

Having thus explained my invention, what I claim is—

1. The combination of a supporting-frame, a tilting rack pivoted thereto, provided with rails at right angles to the axis on which the rack oscillates, said rails being a proper distance apart for the support of hens' eggs placed side by side between them, and means for arresting the rack at a slight incline to the horizontal in either direction to which it may be tilted, substantially as described.

2. The combination of the standards provided with vertical grooves and supporting-pins crossing the grooves at different heights, and oscillatory racks provided with pivot-pins adapted to rest within said grooves on said supporting-pins, said racks having rails at right angles to their axes of oscillation a proper distance apart for the support of eggs placed side by side between them, substantially as described.

3. The improved egg-preserver herein described, the same consisting of the base A, bar D, standards B, provided with the grooves *m*, and pins *d*, rack E, provided with the pins *v*, racks F G, provided with the pins *x*, and the wire K, constructed, combined, and arranged to operate substantially as set forth.

GEORGE CONANT.

Witnesses:
C. A. SHAW,
L. J. WHITE.

771 (Defendant's Exhibit P, Letters Patent No. 3
C. Bassini & A. Heyden, November 17, 188

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GEORGE CONANT.

Witnesses:
C. A. SHAW,
L. J. WHITE.

771 (Defendant's Exhibit P, Letters Patent No. 330,457 to C. Bassini & A. Heyden, November 17, 1885.)

C. BASSINI & A. HEYDEN.

INCUBATOR.

No. 330,457. Patented Nov. 17, 1885.

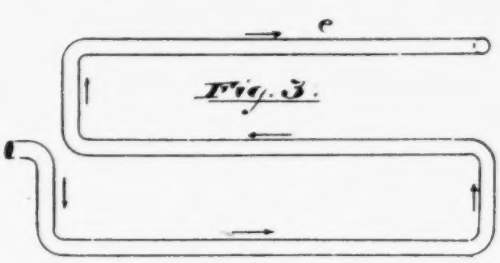

Fig. 3.

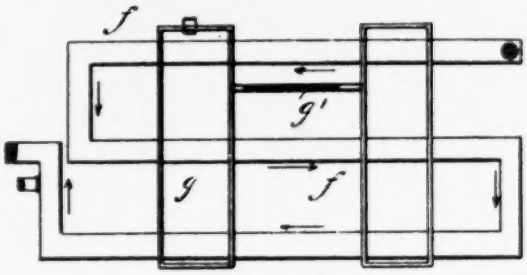

Fig. 4.

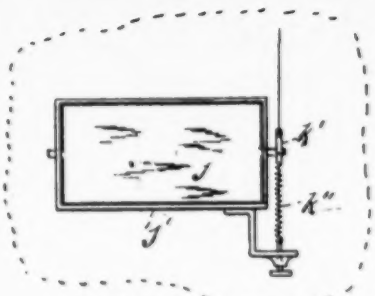

Fig. 6.

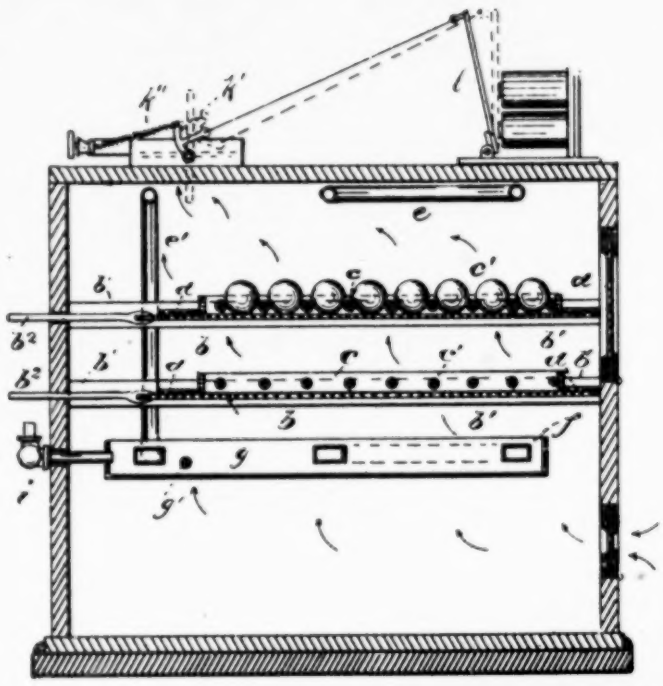

Fig. 5.

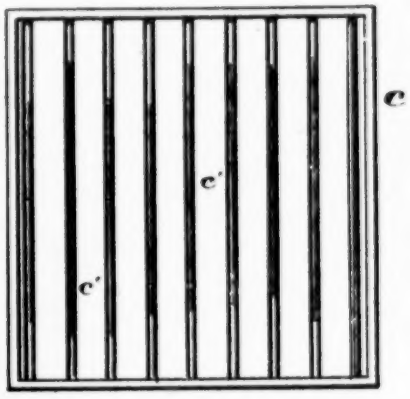

Fig. 7.

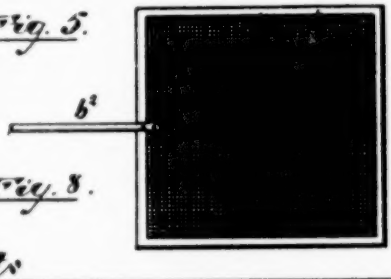

Fig. 8.

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Fred. S. Adams

Inventors:

Charles Bassini,
Adolf Heyden,
by Drake & Co
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C. BASSINI & A. HEYDEN.

INCUBATOR.

No. 330,457. Patented Nov. 17, 1885.

Fig. 1.

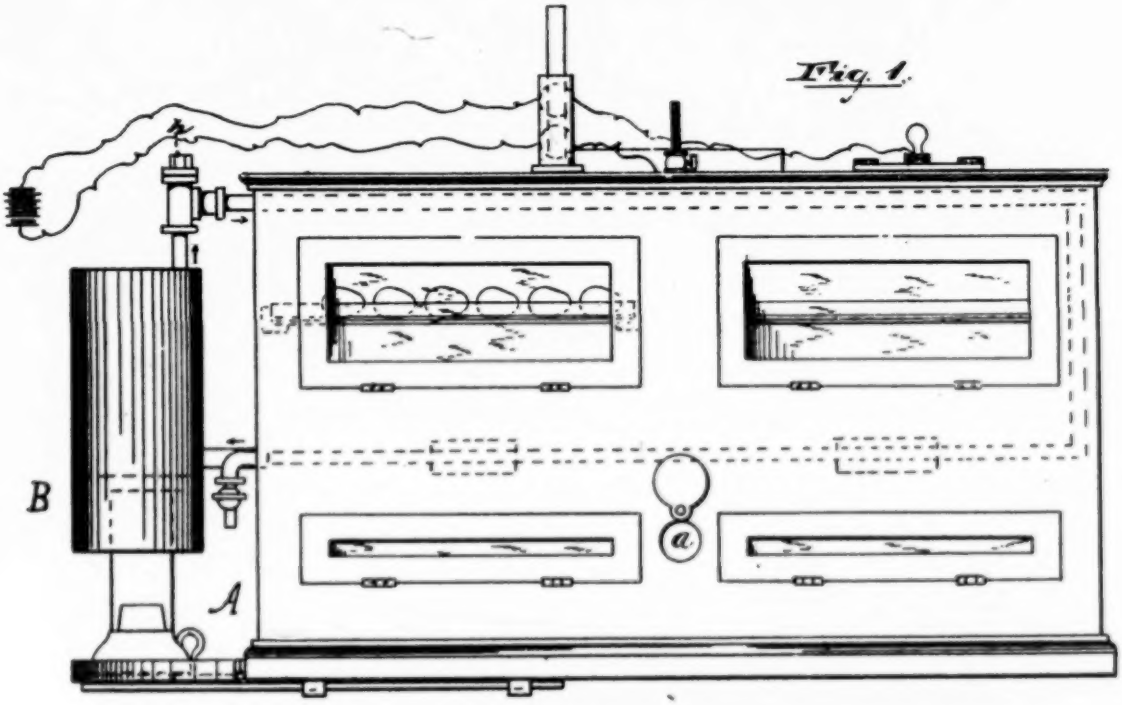
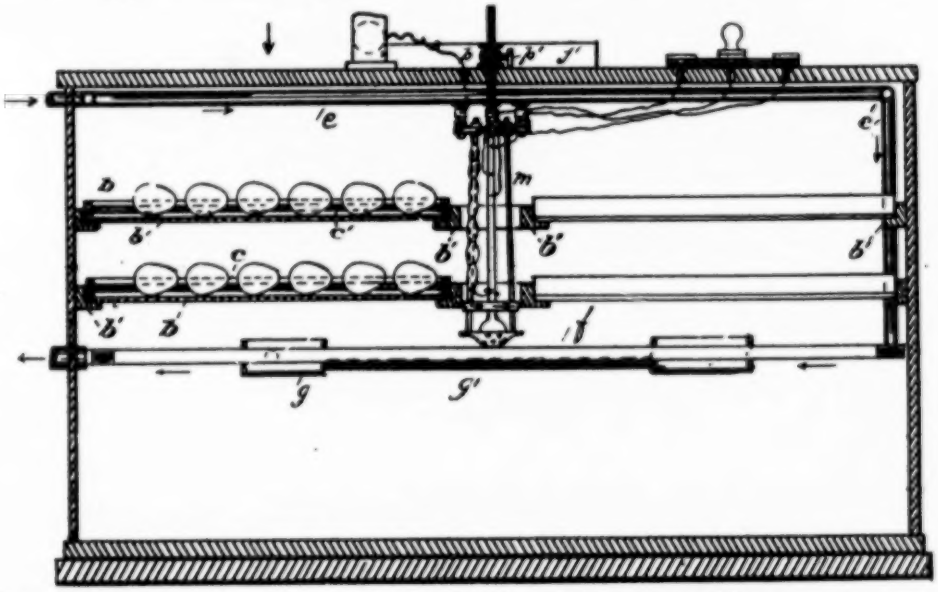


Fig. 2.



Attest:

Wm. F. Campbell.
Fred. S. Adams

Inventors:

Charles Bassini,
and Adolf Heyden,
by Drake & Co

UNITED STATES PATENT

CHARLES BASSINI, OF IRVINGTON, AND ADOLF HE
NEW JERSEY.

INCUBATOR.

SPECIFICATION forming part of Letters Patent No. 330,457, da

Application filed April 16, 1885. Serial No. 162,449. (No m

To all whom it may concern:

Be it known that we, CHARLES BASSINI and ADOLF HEYDEN, citizens of the United States, residing at Irvington and Newark, respectively, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Incubators; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Our invention relates to incubators for the artificial hatching of chickens, &c.; and it consists more particularly in the improved mechanism for turning the eggs without necessitating access to the interior of the box, and in the novel construction and arrangement of the heating and air-moistening apparatus.

In the accompanying drawings, Figure 1 is a front elevation of an incubating box and boiler illustrating our invention. Fig. 2 is a longitudinal section of the same. Figs. 3 and 4 are plan views of the upper and lower heating-coils, respectively. Fig. 5 is a transverse section in the direction of *x* in Fig. 2. Fig. 6 is a plan view of the damper and adjacent mechanism. Fig. 7 is a plan view of an egg-receiving frame, and Fig. 8 is a similar view of one of the slides or tables.

Similar letters of reference indicate like parts.

A is the incubating box or chamber, provided with glass-paneled doors. In the front side of said box is an opening, *a*, for the admission of fresh air. Said opening is provided with a pivoted lid or cover, as shown. In large boxes several openings similar to *a* may be provided. In the top of the box A is arranged a damper, *j*, which when opened allows of the escape of the warm air from the box. Inside the box are secured grooved ways, *b'*, which support and in which move the slides or tables *b*. Each slide is provided with a rod, *b²*, which extends through the back of the box. By means of this rod the slide may be conveniently reciprocated in its ways. Above each of the slides *b* is an egg-receiving frame, *c*, gular frame-work bars, or partitions. the slide beneath it vented from movi or strips, *d*, whic tionary position. made of wire, an in rear of the fra box A at their en the spaces betwe the frames *c*, and meet the upper su the slides *b* are rec eggs are thereby t are supported by titions of the fra with their whole

We are aware t placed between th and caused to rest whereby they ar gresses, the frame carried along by t tion the whole we web, and, as some ers, this weight i web then sinks than in others, an unevenly rotated, along by the web contact with thei the web is moved. device is that the sisted by the wei upon it.

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C. BASSINI & A. HEYDEN.

INCUBATOR.

Patented Nov. 17, 1885.

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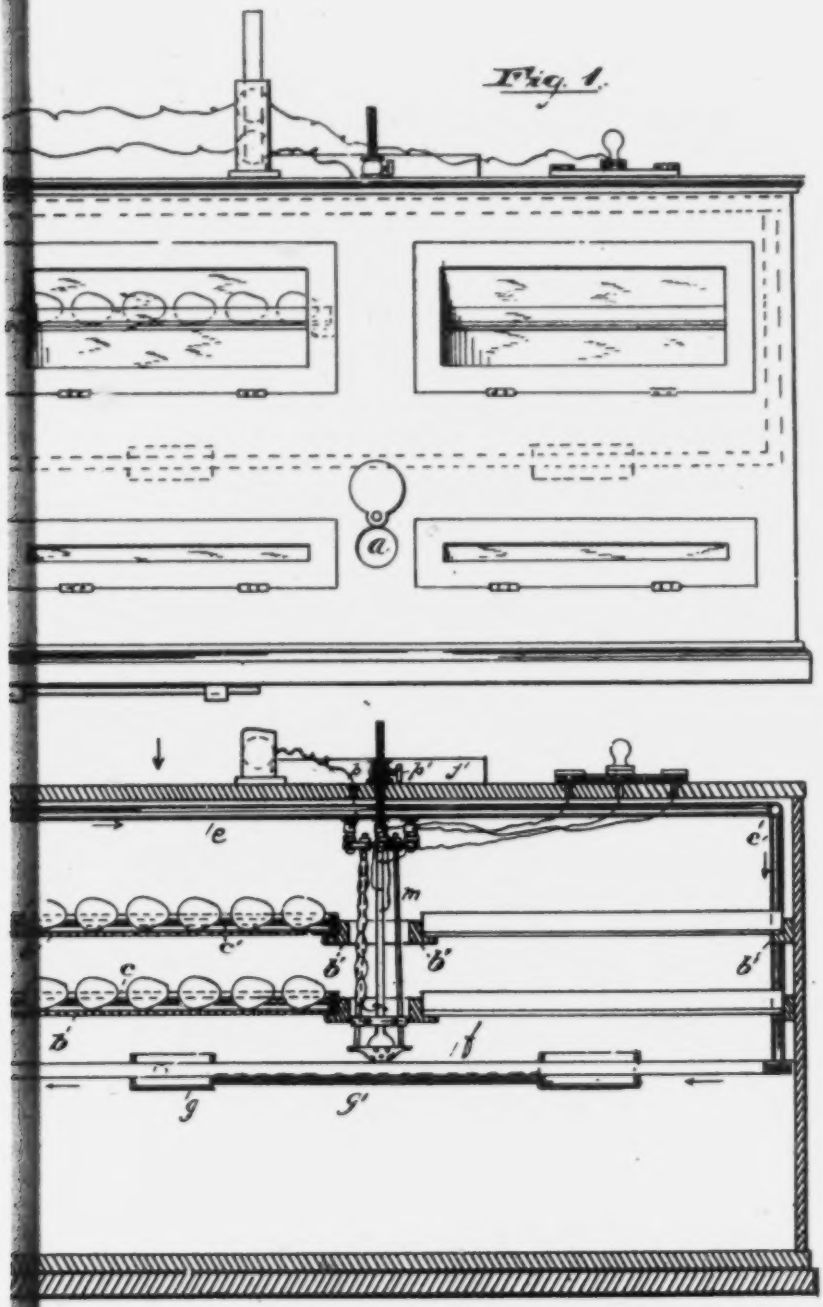

Inventors:

Charles Bassini,
and Adolf Heyden,
by Drake & Co

CHARLES BASSINI, OF IRVINGTON, AND ADOLF HEYDEN, OF NEWARK, NEW JERSEY.

INCUBATOR.

SPECIFICATION forming part of Letters Patent No. 330,457, dated November 17, 1885.

Application filed April 16, 1885. Serial No. 162,449. (No model.)

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We are aware that eggs have hitherto been placed between the bars of a stationary frame and caused to rest upon a moving web beneath, whereby they are turned as the web progresses, the frame preventing the eggs being carried along by the web. By this construction the whole weight of the eggs rests on the web, and, as some eggs are heavier than others, this weight is unequally disposed. The web then sinks down more in some places than in others, and the eggs become displaced, unevenly rotated, and, besides, are carried along by the web and brought into jarring contact with their retaining-bars whenever the web is moved. Another difficulty of this device is that the movement of the web is resisted by the weight of all the eggs resting upon it.

Inasmuch as the smallest crack in the shell will prevent the hatching of an egg, it is exceedingly important in devices of this sort that the mechanism for turning the eggs should move freely and easily, and that above all the eggs should not be subjected to jars or shocks.

By our invention the above requirements are secured and the difficulties mentioned wholly avoided. The transverse bars of our frame support the weight of the egg. The body of the egg protrudes below the slats sufficiently to make contact with the slide, and the slide in moving turns the eggs.

We find it preferable to make the slides

with roughened or corrugated surfaces, and also to form holes through them so as to allow free circulation of air to the eggs. In practice we find wire cloth or netting to be well adapted for this purpose, inasmuch as it is sufficiently rough to engage with and easily move the eggs, while it also allows free circulation of the heated air through its meshes.

Referring now more particularly to the heating apparatus, B is a boiler arranged outside the box A, and heated by a lamp or any other suitable means. Connected with the upper portion of said boiler, and arranged in the upper portion of the box, is a coil of tubes, *e*. Connected with the lower part of the boiler, and disposed in the lower part of the box, is a coil of tubes, *f*. The two coils *e* and *f* communicate by a vertical tube, *e'*.

The egg-receiving devices above described are disposed between the coils *e* and *f*. In said coils there is a constant circulation of water from the boiler, and hence heat is radiated from them, and by this means the air within the box A is suitably warmed.

We find it especially advantageous to employ coils of tubes in lieu of tanks or other large receptacles for the hot water and steam, because a better circulation is obtained, their contents are more quickly heated, they occupy less space in the box, they are not so liable to become leaky by expansion and contraction, they are more easily got at and removed for repair, they allow of circulation of air between the tubes and hence of unobstructed draft between air inlet and outlet, they are cheaper in construction, and by actual experiment we find that the warmth diffused is much more equable and uniform.

In order to render the heated air properly moist, we provide open pans *g*, which are placed in the lower part of the box. Through these pans pass the tubes of the lower coil, *f*. The pans are filled with water, which is slowly evaporated by the heat obtained from the warm tubes passing through it. The vapor thus generated thoroughly and uniformly moistens the air in the box.

It is well known that the temperature within an incubating-box must be steadily maintained at certain points, and that it should range between 104° Fahrenheit at the beginning of the incubation to 98° Fahrenheit at the end.

In order properly to regulate the temperature in our device, we arrange in connection with the damper *j* an electrical thermostat, which when the degree of temperature in the box rises unduly opens the damper, and on a lowering of the temperature causes the damper to close. When the damper is open, the heated air escapes, and the aperture *a* in the lower part of the case also being open cold air is free to enter.

The heat-regulating contrivance which we preferably employ comprises a mercurial thermometer, *m*, which acts as a circuit-closer when the mercury in rising reaches certain predetermined points, and so establishes a current from a battery through an electro-magnet, energizing the latter and causing it to attract its armature *l*.

From Figs. 5 and 6 it will be seen that the damper is journaled in a frame, *j'*, and provided at one end with an arm, *k'*, which is connected to the armature *l*. Said arm is also provided with a spring, *k''*. The armature when attracted by the electro-magnet opens the damper, and when the armature is released the damper is closed by the action of the spring *k''*.

We do not limit ourselves to the use of the particular electrical heat-regulator here shown in connection with the damper of our incubator; neither do we herein claim the construction and arrangement of the heat-regulating device above described, because the same is fully set forth and claimed by us in another application for Letters Patent No. 172,270, filed July 22, 1885.

Referring now to the particular arrangement and construction of an incubator, it will be seen that we arrange our egg-receptacles between the heating-coils, and hence in the place where there is most uniform heat; also, that our open water-vessels *g* are placed in the lower part of the box, and are traversed by the lower coils. Being directly below the eggs, the moisture from said vessels rising of course meets the eggs. We place our air-inlet below the lower coil and also below the water-vessels so that the incoming cold air is not only warmed by contact with the lower coil, but is also moistened by meeting the vapor rising from the open vessels before it encounters the eggs. In this way we prevent sudden chilling drafts and like abrupt variations of temperature. Our damper, on the other hand, is placed above the top coils, and hence is in the best position to carry off the heated air. It will be seen, therefore, that in operation the fresh-air supply enters at the air-inlet, thence passes around the first or lower heating-coil and over the moistening-pans, thence to and around the eggs, thence to and around the upper or second heating device, and then through the damper if the latter be open.

We claim as our invention—

1. In an incubator, the combination of a horizontally-reciprocating slide and a stationary frame supported above said slide, provided with transverse slats or bars, between and upon which bars the eggs are received and supported, substantially as described.

2. In an incubator, the combination of the incubator-box provided with air-inlets, an egg-receptacle therein supported upon a perforated reciprocating slide, a boiler or heater, heating-coils in said box above and below said egg-receptacle, connecting-pipes *e'*, damper *j*, and means for automatically opening said damper.

3. In an incubator, the combination, with the incubator-box provided with air-inlet *a* and damper *j*, of the upper and lower heating-

coils, *e f*, connecting-pipes *e'*, and an open water-vessel, *g*, through which the lower coils, *f*, pass, substantially as described.

4. In an incubator, the combination of an incubating-box, egg-receptacles therein supported upon reciprocating perforated slides, an open water-vessel, and heating coils or pipes passing through said vessel, substantially as described.

5. An incubator consisting of an incubating-box provided with air-inlet *a*, and damper *j*, egg-receptacles on said box supported above reciprocating perforated slides, a boiler or heater, upper co
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coils, *e f*, connecting-pipes *e'*, and an open water-vessel, *g*, through which the lower coils, *f*, pass, substantially as described.

4. In an incubator, the combination of an incubating-box, egg-receptacles therein supported upon reciprocating perforated slides, an open water-vessel, and heating coils or pipes passing through said vessel, substantially as described.

5. An incubator consisting of an incubating-box provided with air-inlet *a*, and damper *j*, egg-receptacles on said box supported above reciprocating perforated slides, a boiler or heater, upper coils, *e*, lower coils, *f*, connecting-pipes *e'*, and open water-vessels through which the lower coils pass, the parts being combined substantially as described.

In testimony that we claim the foregoing we have hereunto set our hands this 11th day of April, 1885.

CHARLES BASSINI.
ADOLF HEYDEN.

Witnesses:
FREDERICK F. CAMPBELL,
OSCAR A. MICHEL.

778 (Defendants' Exhibit P, Letters Patent No. 344,474 to J. W. Campbell, June 29, 1886.)

632 (No Model.) 2 Sheets—Sheet 2.

J. W. CAMPBELL.

HEAT REGULATING ATTACHMENT FOR INCUBATORS.

No. 344,474. Patented June 29, 1886.

Fig. 3.

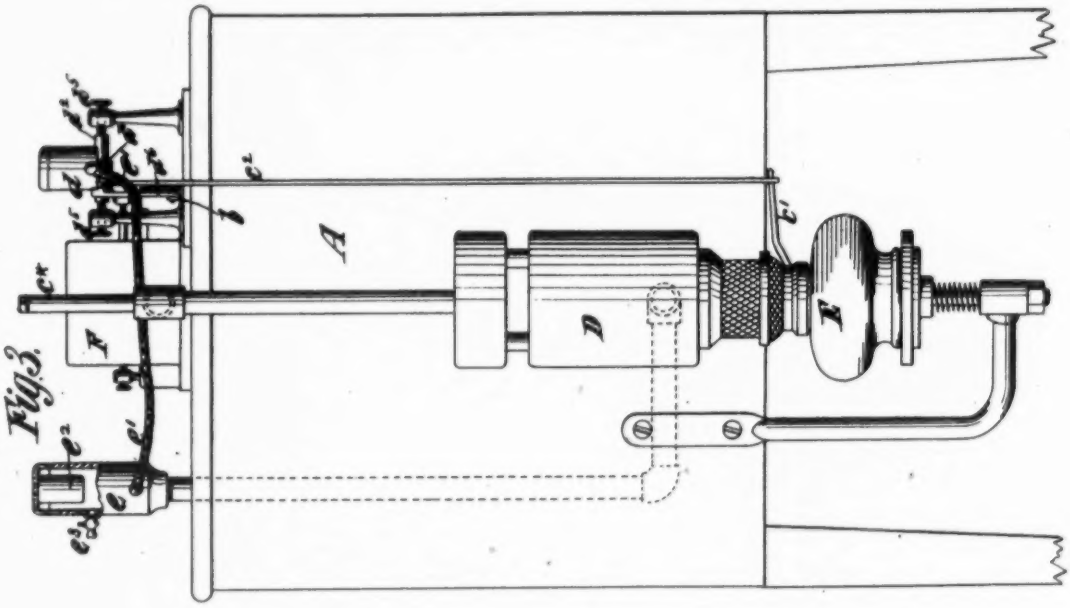
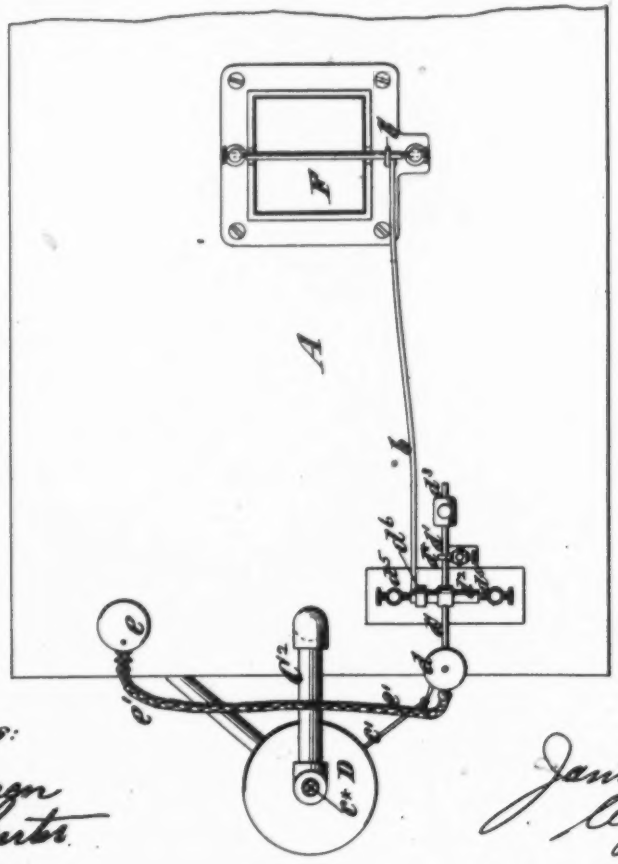


Fig. 2.



Witnesses:
C. Sundgren
Emil Hunter

Inventor:
James W. Campbell
by his attys
Brown & Hall

634 (No Model.) 2 Sheets—Sheet 1.

J. W. CAMPBELL.

HEAT REGULATING ATTACHMENT FOR INCUBATORS.

No. 344,474. Patented June 29, 1886.

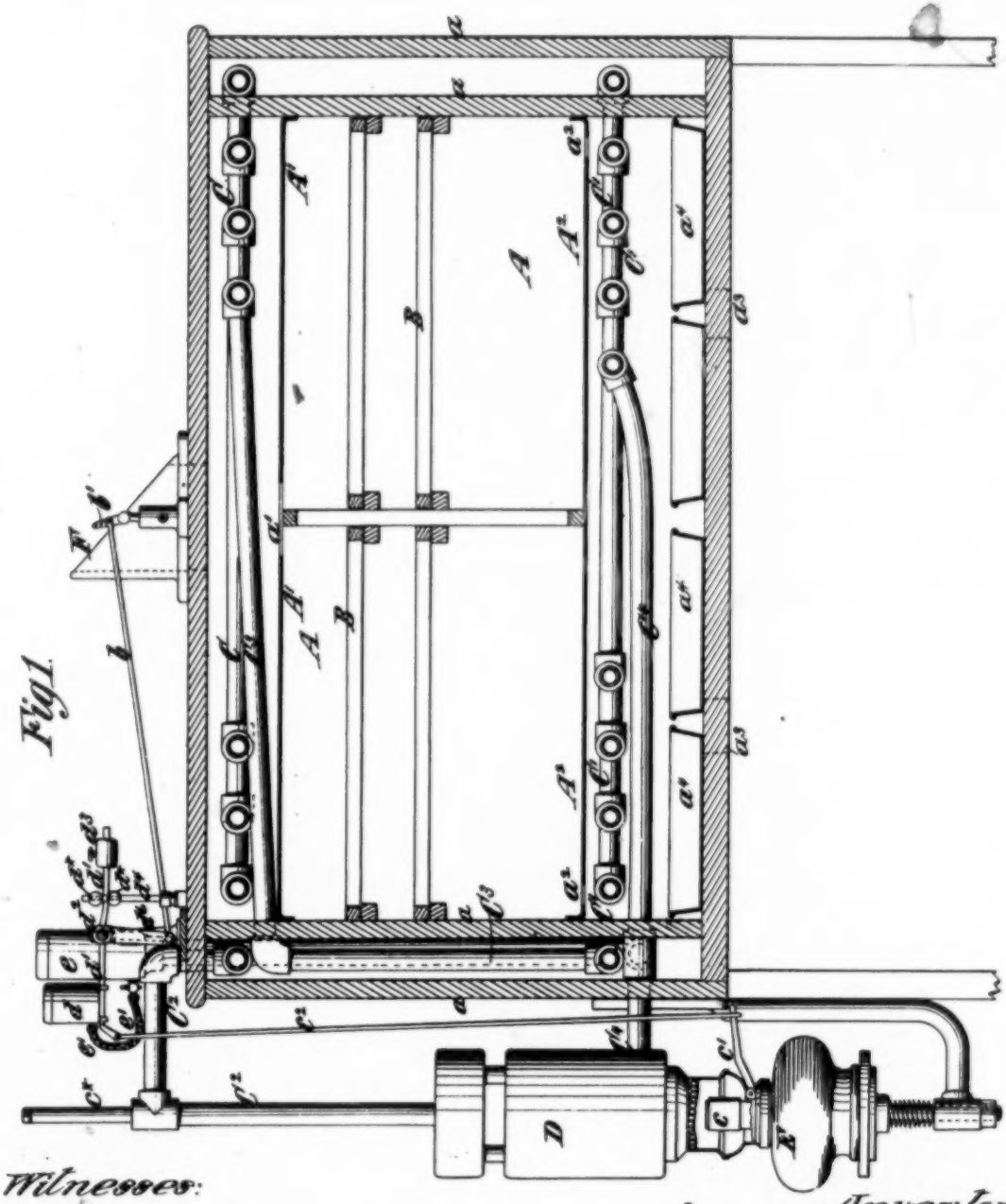


Fig 1.

Witnesses:
C. L. Sundgren
Emil Hunter

Inventor.
James W. Campbell
by his Attys
Brown & Hall

UNITED STATES PATEN

JAMES W. CAMPBELL, OF GERMANTOWN

HEAT-REGULATING ATTACHMENT FO

SPECIFICATION forming part of Letters Patent No. 344,

Application filed March 6, 1886. Serial No. 194,205. (N

To all whom it may concern:

Be it known that I, JAMES W. CAMPBELL, of Germantown, in the county of Columbia and State of New York, have invented a new and useful Improvement in Heat-Controlling Attachments for Incubators, of which the following is a specification.

My invention relates more particularly to incubators, in which the egg-chamber is heated by means of a water-heater and a system of circulating-pipes, comprising heating-coils arranged in the upper and lower parts of the incubator-chamber.

The water-heater has been heretofore heated by means of a lamp or oil-burner having a flame-controlling device adjustable relatively to the wick-tube, and by this device the amount of heat imparted to the water is controlled.

The object of my invention is to provide for properly operating either the ventilator at the top of the incubator or the heat-controlling device of the water-heater, or both these parts, by means of the expansion of the water in the heater and system of circulating-pipes.

In order to utilize the excessive expansion of the water in the heating system when unduly heated for operating the ventilator and the heat-controlling device, I employ a balance carrying a water-chamber, which is in constant communication through a flexible tube with the circulating system, and which is arranged just above the level of liquid in the circulating system, that liquid being heated to the desired degree.

This chamber, on the liquid or water rising into it by undue expansion, will fall, and thereby shift the ventilator and the heat-controlling device, either or both. I prefer to mount the water-chamber on one end of the beam, which is weighted on the other end, and connect it with a water-reservoir which surmounts the system of circulating-pipes, and which has its upper portion contracted in area, so that the balanced chamber will not receive a large volume of water when it falls, by reason of the small quantity of water entering it.

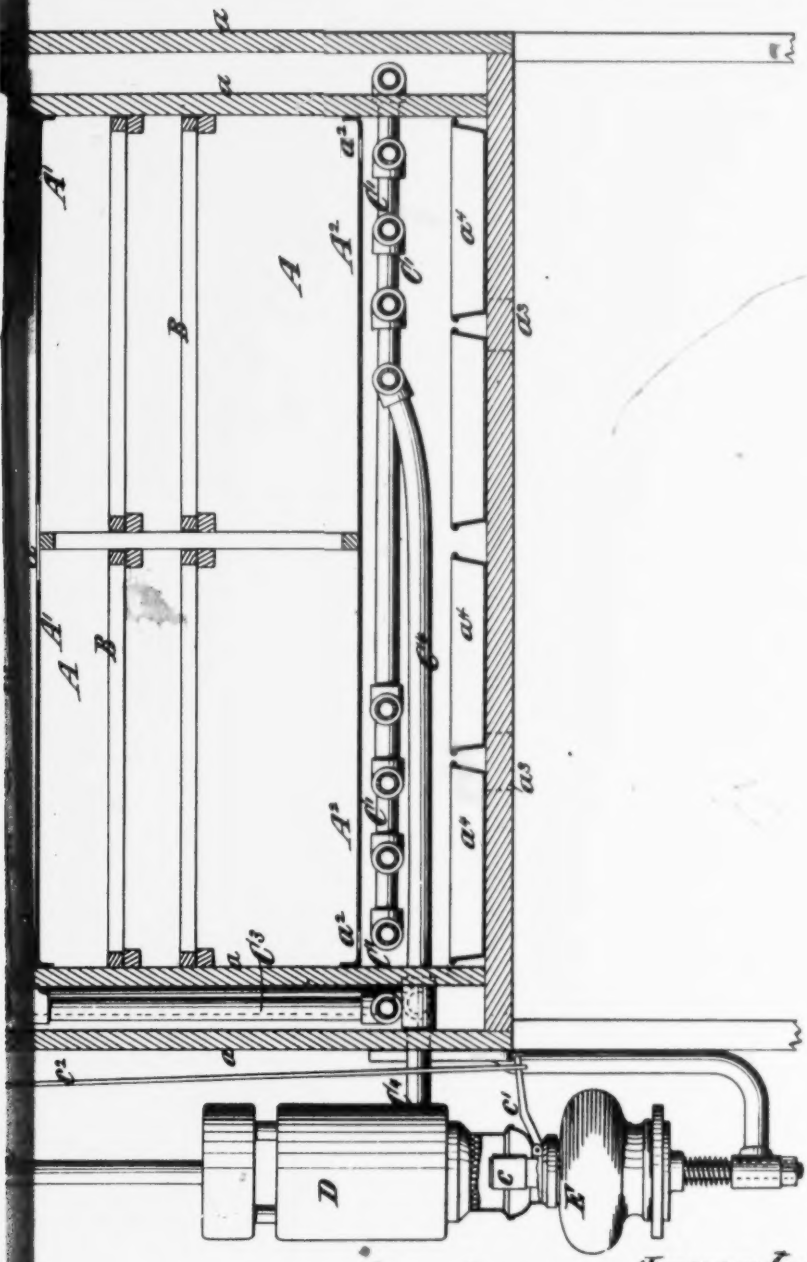
In the accompanying drawings, Figure 1 is a vertical section of an incubator having my attachments applied thereto. Fig. 2 is a plan thereof; and Fig. 3 is an end view showing the water-reservoi
chamber is sup
Similar letter
sponding parts
A designates
double walls *a*,
for eggs.
C C are upper
with the heate
system. The w
E, and is condu
per heating-coil
lower heating-c
C', to the heate
A' A² are baff
below the uppe
lower heating c
openings *a' a²*.
In the bottom
openings *a³* and
the air.
At the top o
have represente
may be swung
rod, *b*, connecte
ots of the vent
the heat to whi
jected I have re
vided with a fl
device, *c*, which
a rod, *c²*, may b
and the heat pr
employ means
the heat-control
both of them, be
rising into a ba
in the system o
heated. As her
a balanced water
upon a beam or
having an adjust
end opposite the
also shown the
surmounted by
connected by a fl
balanced water-c
or lever *d'* oper
which are adjust
different distanc
The pivot *d²* of t

2 Sheets—Sheet 1.

J. W. CAMPBELL.

REGULATING ATTACHMENT FOR INCUBATORS.

Patented June 29, 1886.



Witnesses:

Inventor:
James W. Campbell
by his Attys
Brown & Hall

UNITED STATES PATENT OFFICE.

JAMES W. CAMPBELL, OF GERMANTOWN, NEW YORK.

HEAT-REGULATING ATTACHMENT FOR INCUBATORS.

SPECIFICATION forming part of Letters Patent No. 344,474, dated June 29, 1886.

Application filed March 6, 1886. Serial No. 194,205. (No model.)

To all whom it may concern:

Be it known that I, JAMES W. CAMPBELL, of Germantown, in the county of Columbia and State of New York, have invented a new and useful Improvement in Heat-Controlling Attachments for Incubators, of which the following is a specification.

My invention relates more particularly to incubators, in which the egg-chamber is heated by means of a water-heater and a system of circulating-pipes, comprising heating-coils arranged in the upper and lower parts of the incubator-chamber.

The water-heater has been heretofore heated by means of a lamp or oil-burner having a flame-controlling device adjustable relatively to the wick-tube, and by this device the amount of heat imparted to the water is controlled.

The object of my invention is to provide for properly operating either the ventilator at the top of the incubator or the heat-controlling device of the water-heater, or both these parts, by means of the expansion of the water in the heater and system of circulating-pipes.

In order to utilize the excessive expansion of the water in the heating system when unduly heated for operating the ventilator and the heat-controlling device, I employ a balance carrying a water-chamber, which is in constant communication through a flexible tube with the circulating system, and which is arranged just above the level of liquid in the circulating system, that liquid being heated to the desired degree.

This chamber, on the liquid or water rising into it by undue expansion, will fall, and thereby shift the ventilator and the heat-controlling device, either or both. I prefer to mount the water-chamber on one end of the beam, which is weighted on the other end, and connect it with a water-reservoir which surmounts the system of circulating-pipes, and which has its upper portion contracted in area, so that the balanced chamber will not receive a large volume of water when it falls, by reason of the small quantity of water entering it.

In the accompanying drawings, Figure 1 is a vertical section of an incubator having my attachments applied thereto. Fig. 2 is a plan thereof; and Fig. 3 is an end view showing the water-reservoir, from which the balanced chamber is supplied, partly in section.

Similar letters of reference designate corresponding parts in the several figures.

A designates the incubator-chamber having double walls *a*, and within which are trays B for eggs.

C C′ are upper and lower heating coils, which, with the heater D, form a water-circulating system. The water may be heated by a lamp, E, and is conducted by a pipe, C^2, to the upper heating-coil, C, thence by a pipe, C^3, to the lower heating-coil, C′, and thence by a pipe, C^1, to the heater D.

A′ A^2 are baffle-plates or deflectors arranged below the upper heating coil and above the lower heating coil, and having, respectively, openings a' a^2.

In the bottom of the chamber are air-inlet openings a^3 and water-pans a^1, for moistening the air.

At the top of the incubator-chamber A, I have represented a hinged ventilator, F, which may be swung upon its pivots by means of a rod, *b*, connected with an arm, *b′*, on the pivots of the ventilator, and in order to control the heat to which the water-heater D is subjected I have represented the lamp E as provided with a flame regulator or controlling device, *c*, which, by means of a lever, *c′*, and a rod, c^2, may be shifted to control the flame and the heat produced by the lamp. I also employ means whereby the ventilator F and the heat-controlling device *c* may, either or both of them, be shifted by the weight of water rising into a balanced vessel when the water in the system of circulating-pipes is unduly heated. As here represented, I have shown a balanced water-chamber, *d*, which is mounted upon a beam or lever, *d′*, fulcrumed at d^2, and having an adjustable weight, d^3, applied to the end opposite the vessel or chamber *d*. I have also shown the system of circulating-pipes as surmounted by a water-reservoir, *e*, which is connected by a flexible pipe or tube, *e′*, with the balanced water-chamber *d*. The balance beam or lever *d′* operates between two stops, d^4, which are adjustable upward and downward at different distances apart upon a standard, d^5. The pivot d^2 of the beam *d′* may be supported

by pivot-screws d^2, as best shown in Figs. 2 and 3, and it has an arm, d^4, with which the rod *b*, for controlling the ventilator F, is connected, and the rod c^3, which serves to move the heat-controlling device, is also connected with the extremity of the lever or beam d'. The upper part of the water-reservoir *e* should be greatly contracted in area, for a purpose hereinafter described, and in Fig. 3 I have represented this contraction as produced by a downwardly-extending projection, e^3, on the cap which closes the upper end of the reservoir *e*. When the water becomes unduly heated and the temperature in the incubator-chamber approaches the maximum limit, the great expansion of water will cause a volume of water to flow into the balance-chamber *d* sufficient to overcome the weight d^3 and to cause the chamber to fall, thereby shifting the flame-controlling device *c*, and also opening the ventilator. It will be understood that the water rises to a considerable height in the water-reservoir *e* before it enters the balance-chamber *d*, and hence, as the balance-chamber falls by the increment of weight due to the volume of water entering it, a larger volume of water will flow into the chamber *d* and hold it down for a longer time than is desired. To prevent a too great increment of water into the chamber *d* when it thus falls, I contract the upper part of the water-reservoir *e*, so that after the water rises therein to the bottom of the plug or projection e^2 a further rise will represent but a very small volume of water, and these parts should be so arranged that the bottom of the plug or projection e^2 will be on about a level with the bottom of the balance water-chamber *d* when the latter is in its lowest position. If it is desired to change the degree of heat in the incubator-chamber, it may be accomplished by adding a small quantity of water through the pipe c^*, which surmounts the system of circulating-pipes, or by drawing off a small quantity of water through the cock e^3. If it is desired to maintain a less degree of heat in the incubator-chamber, a small quantity of water may be added through the pipe c^*; but if it be desired to increase the temperature of the chamber a suitably-small quantity of water may be drawn off through the cock e^3.

I am aware that heat-controlling devices for incubators and ventilators for other purposes have been controlled by the expansion of air or vapor of liquid under excess of heat acting upon mercury to operate a balance, and hence do not claim such device as of my invention. In my incubator I employ a closed circulating system for heating, and a water vessel or chamber, *d*, which is in constant communication with said circulating system, is arranged at such a height that when the desired heat is not exceeded the chamber *d* will receive no water; but when the desired temperature is exceeded the chamber will receive an increment of water by reason of expansion of the water in the circulating system, and the chamber, by the addition of the water to its weight, will fall and move the balance-beam d'.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with a ventilator or heat-controlling device of an incubator, a water-heater, and a system of circulating-pipes for heating the incubator, of a balanced water-chamber in closed and constant communication with the circulating system, and arranged just above the level of water in the system, said water being heated to the desired degree, and into which water from the system will flow on being expanded by excess of heat, and connections through which the ventilator or heat-controlling device will be shifted by the downward movement of such water-chamber on said water rising thereinto, substantially as herein described.

2. The combination, with a ventilator or heat-controlling device of an incubator, a water-heater, and a system of circulating pipes for heating the incubator, of a weighted beam carrying a water-chamber which has a constant communication through a flexible tube with the circulating system, and is arranged just above the level of water in the system, said water being heated to the desired degree, and a connection between said beam and the ventilator or heat-controlling device, whereby said ventilator or heat-controlling device will be shifted on said water rising into the water-chamber by undue expansion produced by excess of heat, substantially as herein described.

3. The combination, with the ventilator or heat-controlling device of an incubator, of a water-heater and a system of circulating-pipes for heating the same, a water-reservoir, *e*, surmounting the system of pipes, and having the water-space in its upper portion contracted, and a balance supporting a water-chamber connected flexibly with the water-reservoir, and itself connected with the ventilator or heat-controlling device, substantially as herein described.

JAMES W. CAMPBELL.

Witnesses:
LEWIS E. DICK,
CLAUDIUS ROCKEFELLER.

784 (Defendants' Exhibit P, Letters Patent No. 55
T. R. C. Christianson, May 5, 1896.)

rews d^5, as best shown in Figs. 2 it has an arm, d^6, with which the ntrolling the ventilator F, is con- the rod c^3, which serves to move ntrolling device, is also connected remity of the lever or beam d'. The of the water-reservoir e should be tracted in area, for a purpose here- ribed, and in Fig. 3 I have repre- contraction as produced by a down- ending projection, e^3, on the cap s the upper end of the reservoir he water becomes unduly heated perature in the incubator-cham- hes the maximum limit, the great f water will cause a volume of wa- into the balance-chamber d suffi- rcome the weight d^5 and to cause to fall, thereby shifting the flame- levice c, and also opening the ven- will be understood that the water onsiderable height in the water- before it enters the balance-cham- hence, as the balance-chamber increment of weight due to the ater entering it, a larger volume flow into the chamber d and hold a longer time than is desired. a too great increment of water mber d when it thus falls, I con- per part of the water-reservoir e, the water rises therein to the bot- lug or projection e^2 a further rise t but a very small volume of wa- e parts should be so arranged that of the plug or projection e^3 will a level with the bottom of the r-chamber d when the latter is t position. If it is desired to degree of heat in the incubator- may be accomplished by adding a ty of water through the pipe c^*, unts the system of circulating- drawing off a small quantity of h the cock e^3. If it is desired to ss degree of heat in the incubator- small quantity of water may be gh the pipe c^*; but if it be de- ease the temperature of the cham- y-small quantity of water may be rough the cock e^3.

e that heat-controlling devices for nd ventilators for other purposes ontrolled by the expansion of air liquid under excess of heat acting y to operate a balance, and hence such device as of my invention. ator I employ a closed circulating heating, and a water vessel or chamber, d, which is in constant communication with said circulating system, is arranged at such a height that when the desired heat is not exceeded the chamber d will receive no water; but when the desired temperature is exceeded the chamber will receive an increment of water by reason of expansion of the water in the circulating system, and the chamber, by the addition of the water to its weight, will fall and move the balance-beam d'.

What I claim as my invention, and desire to secure by Letters Patent, is—

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JAMES W. CAMPBELL.

Witnesses:
LEWIS E. DICK,
CLAUDIUS ROCKEFELLER.

784 (Defendants' Exhibit P, Letters Patent No. 559,676 to T. R. C. Christianson, May 5, 1896.)

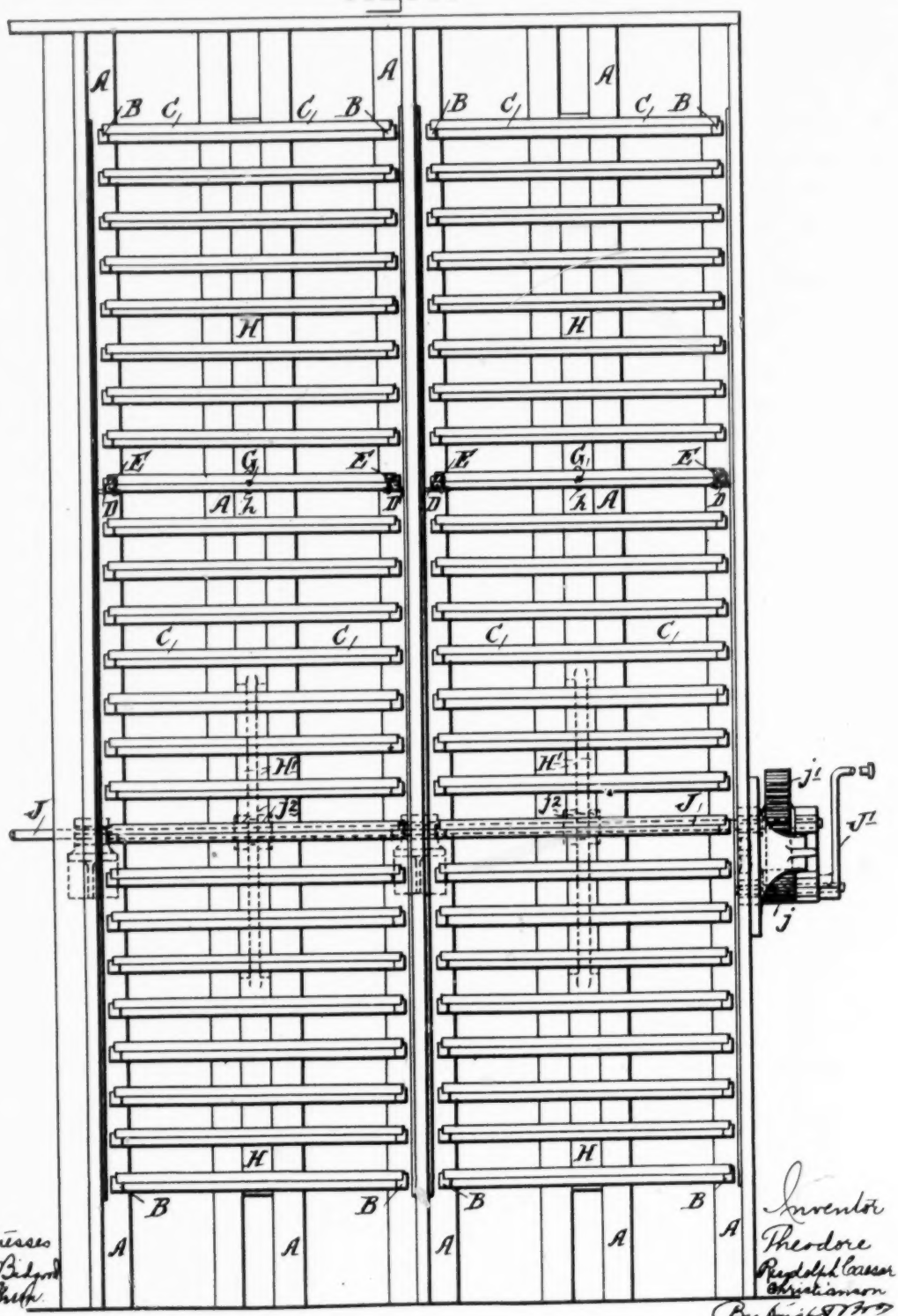
(No Model.) 4 Sheets—Sheet 1.

T. R. C. CHRISTIANSON.

STORING EGGS AND APPARATUS FOR TURNING THEM TO KEEP THEM FRESH.

No. 559,676. Patented May 5, 1896.

Fig. 1.



Witnesses
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J. Guth

Inventor
Theodore
Rudolph Cæsar
Christianson
By Munn & Co
Attys.

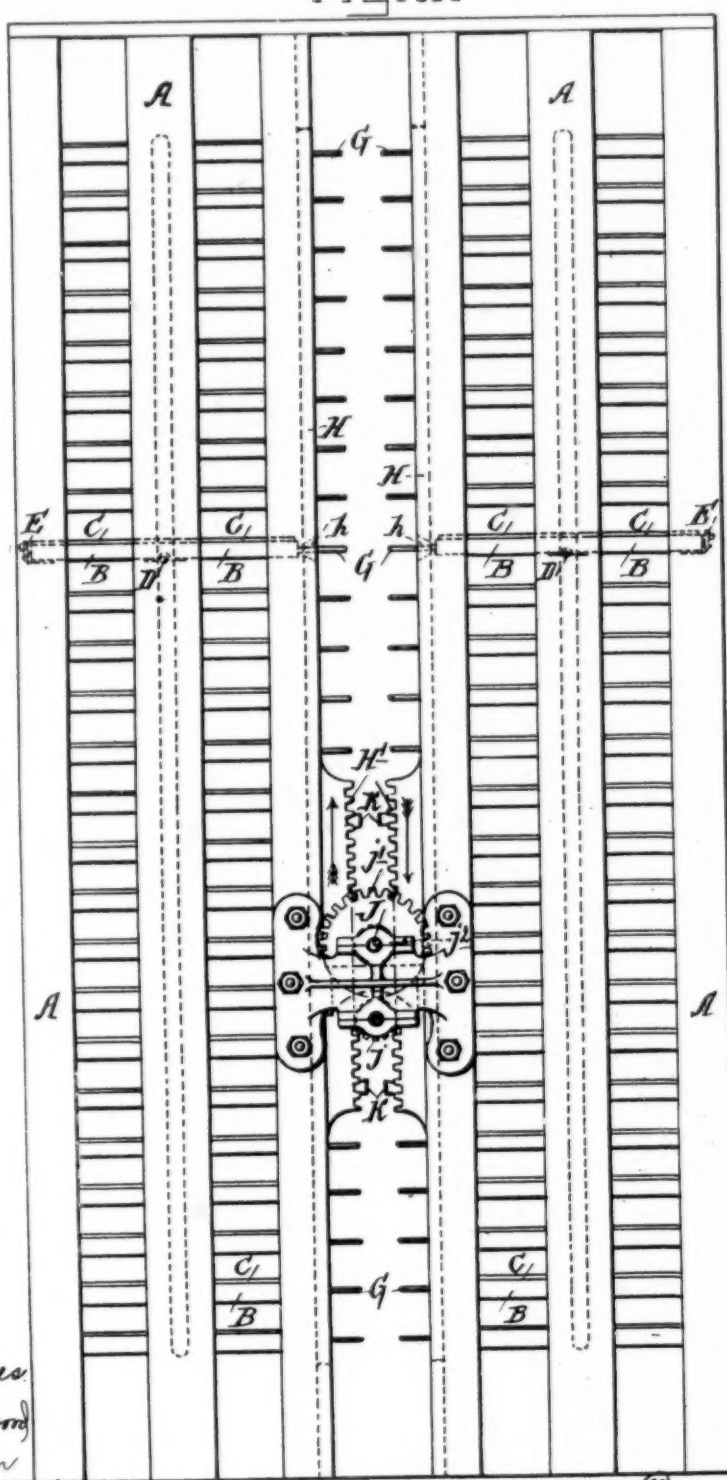
(No Model.) 4 Sheets—Sheet 2.

T. R. C. CHRISTIANSON.

STORING EGGS AND APPARATUS FOR TURNING THEM TO KEEP THEM FRESH.

No. 559,676. Patented May 5, 1896.

Fig. II.



Witnesses
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J. Brown

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Theodore
Rudolph Caesar
Christianson,
By [illegible]
Attys.

642

(No Model.) 4 Sheets—Sheet 3.

T. R. C. CHRISTIANSON.

STORING EGGS AND APPARATUS FOR TURNING THEM TO KEEP THEM FRESH.

No. 559,676. Patented May 5, 1896.

Fig. III.

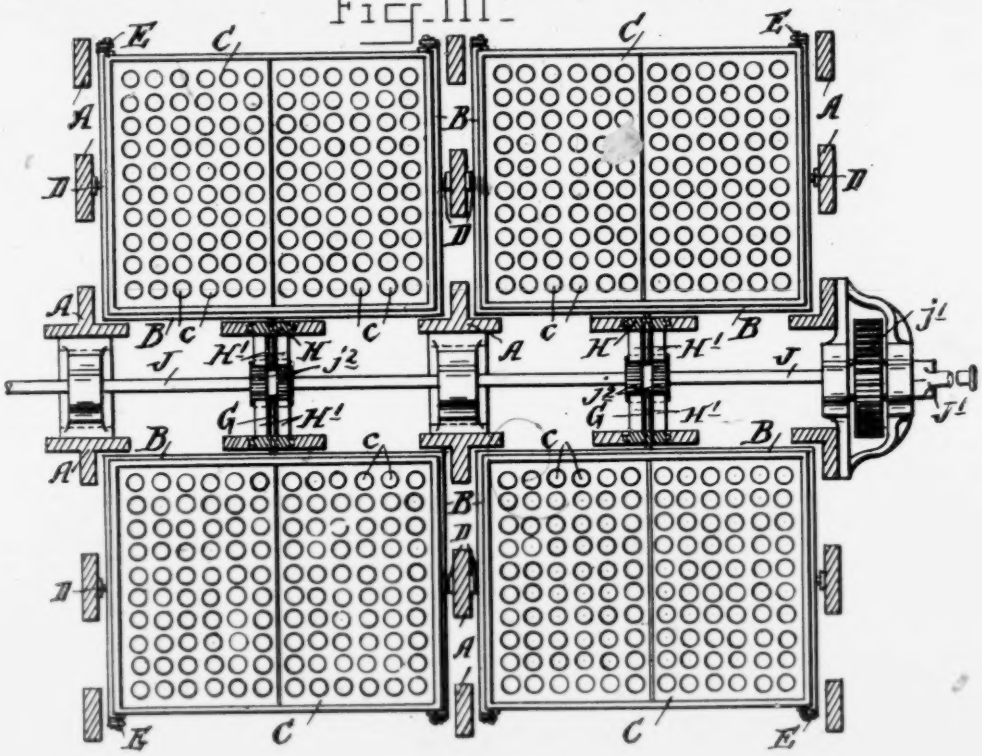


Fig. IV.

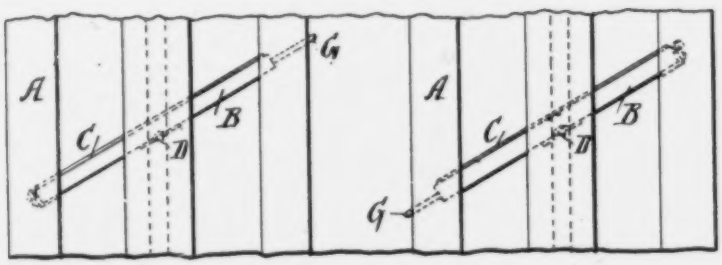
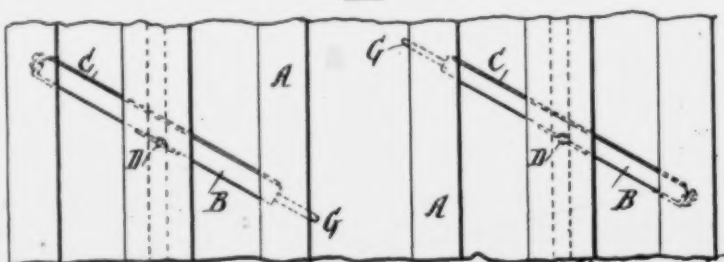


Fig. V.



Witnesses:
M. V. Bidgood
J. A. Deese

Inventor
Theodore Rudolph
Caesar Christianson
By Thos. G. Orrell
Attys.

(No Model.) 4 Sheets—Sheet 4.

T. R. C. CHRISTIANSON.

STORING EGGS AND APPARATUS FOR TURNING THEM TO KEEP THEM FRESH.

No. 559,676. Patented May 5, 1896.

Fig. VI.

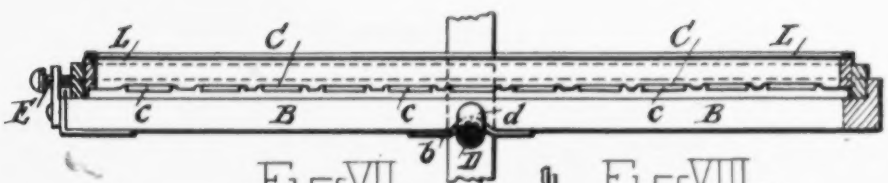


Fig. VII.

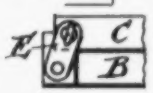


Fig. VIII.

Witnesses
M. V. Bidgood
J. Greer

Inventor:
Theodore Rudolph
Caesar Christianson
By Munn & Co
Attys.

UNITED STATES PATENT OFF

THEODORE RUDOLPH CÆSAR CHRISTIANSON, OF LEITH, S

STORING EGGS AND APPARATUS FOR TURNING THEM TO KEEP THEM FR

SPECIFICATION forming part of Letters Patent No. 559,676, dated May

Application filed April 4, 1895. Serial No. 544,423. (No model.) Patented in England November 2,

To all whom it may concern:

Be it known that I, THEODORE RUDOLPH CÆSAR CHRISTIANSON, a subject of the Queen of Great Britain, residing at Quality Lane, Leith, Scotland, have invented certain new and useful Improvements in Apparatus for Storing and Preserving Eggs, (for which a patent has been granted in England, No. 21,035, dated November 2, 1894;) and I do hereby declare that the following specification, taken in connection with the accompanying drawings, which form a part thereof, is a full, clear, and exact description of my improvements, such as will enable those skilled in the art to make and use the same.

My invention relates to improvements in the class of egg storing and preserving apparatus comprising, essentially, a pivotally-supported tray adapted to receive the eggs, and means for tilting the tray out of a horizontal for changing the position of the eggs and preventing the yolks becoming attached to the shells.

My invention relates particularly to the details of construction, the novel features of which will first be described with reference to the accompanying drawings, and afterward more particularly pointed out in the annexed claims.

In said drawings, Figure I is a front elevation of my improved egg-preserving device. Fig. II is a side elevation of the same. Fig. III is a sectional plan view of same. Figs. IV and V are enlarged detail side elevations representing the two tilted positions of the trays. Fig. VI is an enlarged detail sectional view representing the means for pivotally supporting the frames carrying the egg-trays. Fig. VII is an enlarged detail view of the catch for securing the trays in the pivoted frames. Fig. VIII is an enlarged detail sectional elevation showing one of the pivot-supports.

A is an upright framework, of wood or any other suitable material.

B are a series of small rectangular frames pivotally supported in framework A upon the stationary pins D, and confined upon the pins by the removable head-plates, which are held in place by small bolts *d*. The pins D work in metal bearings *b*, secured to the frames B.

C are the egg-trays, formed, preferably, with individual openings to receive
trays C are adapted to rest u
frames B and be confined or c
by means of the screw-clam
upon frame B, preferably two

G is a pin or rod secured
frames B and passing through
or slots *h*, formed in a longitu
vertical bar H, supported in s
in the upright framework. T
h are expanded or enlarged i
from the inner face, adjacent
toward the other face of the
in order to allow for the free
frames and the bars.

H′ are rack-bars attached
placed to face each other, an
tween them is a cross-shaft J,
*j*², which mesh with the rack
them in opposite directions
frame B when the shaft J is
dle J′ through gearing *j*′.

I prefer to arrange the pivo
two, four, six, or more series,
together to operate in pairs
operating-shaft, and it is the
the apparatus in a cool place
40° Fahrenheit—and the egg
to the air in order to keep the

The eggs are placed in th
trays C with their points do
the proper intervals the gea
to actuate the racks H′. Wh
direction of the arrows, Fig.
carrying the eggs would be ti
sition shown in Fig. IV, and i
reverse direction the trays w
the position shown in Fig. V
the position of the yolk in th
egg to be changed when desi
sure that the yolk is always e
albumen and will not adhere

The trays C and supports
to any desired angle, though
ploy limiting stops or studs
H′, so as to prevent the trays
far. Also, if desired, I may p
C with netting or other cover
as to prevent the eggs from fa
apparatus be jerked; but th
tilting the trays being so unif
slow, it is, under ordinary cir

4 Sheets—Sheet 4.

T. R. C. CHRISTIANSON.

APPARATUS FOR TURNING THEM TO KEEP THEM FRESH.

Patented May 5, 1896.

Fig. VI.

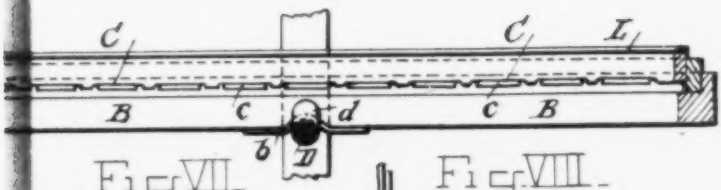


Fig. VII.

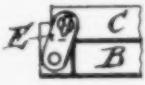
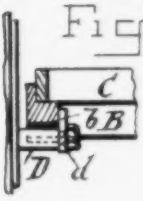


Fig. VIII.



Inventor:—
Theodore Rudolph
Caesar Christianson
By Thos. G. Orr & Son
Attys.

UNITED STATES PATENT OFFICE.

THEODORE RUDOLPH CÆSAR CHRISTIANSON, OF LEITH, SCOTLAND.

STORING EGGS AND APPARATUS FOR TURNING THEM TO KEEP THEM FRESH.

SPECIFICATION forming part of Letters Patent No. 559,676, dated May 5, 1896.

Application filed April 4, 1895. Serial No. 544,423. (No model.) Patented in England November 2, 1894, No. 21,035.

To all whom it may concern:

Be it known that I, THEODORE RUDOLPH CÆSAR CHRISTIANSON, a subject of the Queen of Great Britain, residing at Quality Lane, Leith, Scotland, have invented certain new and useful Improvements in Apparatus for Storing and Preserving Eggs, (for which a patent has been granted in England, No. 21,035, dated November 2, 1894;) and I do hereby declare that the following specification, taken in connection with the accompanying drawings, which form a part thereof, is a full, clear, and exact description of my improvements, such as will enable those skilled in the art to make and use the same.

My invention relates to improvements in the class of egg storing and preserving apparatus comprising, essentially, a pivotally-supported tray adapted to receive the eggs, and means for tilting the tray out of a horizontal for changing the position of the eggs and preventing the yolks becoming attached to the shells.

My invention relates particularly to the details of construction, the novel features of which will first be described with reference to the accompanying drawings, and afterward more particularly pointed out in the annexed claims.

In said drawings, Figure I is a front elevation of my improved egg-preserving device. Fig. II is a side elevation of the same. Fig. III is a sectional plan view of same. Figs. IV and V are enlarged detail side elevations representing the two tilted positions of the trays. Fig. VI is an enlarged detail sectional view representing the means for pivotally supporting the frames carrying the egg-trays. Fig. VII is an enlarged detail view of the catch for securing the trays in the pivoted frames. Fig. VIII is an enlarged detail sectional elevation showing one of the pivot-supports.

A is an upright framework, of wood or any other suitable material.

B are a series of small rectangular frames pivotally supported in framework A upon the stationary pins D, and confined upon the pins by the removable head-plates, which are held in place by small bolts *d*. The pins D work in metal bearings *b*, secured to the frames B.

C are the egg-trays, formed, preferably, with individual openings to receive the eggs. The trays C are adapted to rest upon the pivoted frames B and be confined or clamped in place by means of the screw-clamps E, mounted upon frame B, preferably two for each frame.

G is a pin or rod secured to each of the frames B and passing through one of the holes or slots *h*, formed in a longitudinally-movable vertical bar H, supported in suitable bearings in the upright framework. The holes or slots *h* are expanded or enlarged in vertical width from the inner face, adjacent to the frames B, toward the other face of the bar in both bars in order to allow for the free movement of the frames and the bars.

H′ are rack-bars attached to the bars H, placed to face each other, and journaled between them is a cross-shaft J, carrying pinions j^2, which mesh with the rack-bars and move them in opposite directions for tilting the frame B when the shaft J is rotated by handle J′ through gearing *j*′.

I prefer to arrange the pivoted frames B in two, four, six, or more series, as shown, geared together to operate in pairs from a common operating-shaft, and it is the intention to keep the apparatus in a cool place—say from 38° to 40° Fahrenheit—and the eggs freely exposed to the air in order to keep them cool and fresh.

The eggs are placed in the holes *c* of the trays C with their points downward, and at the proper intervals the gearing is operated to actuate the racks H′. When moved in the direction of the arrows, Fig. II, the trays C carrying the eggs would be tilted into the position shown in Fig. IV, and if actuated in the reverse direction the trays would be tilted to the position shown in Fig. V, thus enabling the position of the yolk in the albumen of the egg to be changed when desired, so as to insure that the yolk is always embedded in the albumen and will not adhere to the shell.

The trays C and supports B may be tilted to any desired angle, though I prefer to employ limiting stops or studs K on the racks H′, so as to prevent the trays being tilted too far. Also, if desired, I may provide the trays C with netting or other covers L, Fig. VII, so as to prevent the eggs from falling should the apparatus be jerked; but the movement in tilting the trays being so uniform, gentle, and slow, it is, under ordinary circumstances, im-

646

possible for a sudden jerk to take place, the whole thus forming an apparatus in which eggs may be stored and in which eggs are mechanically turned from time to time, as desired, so as to alter the position of their yolks, and at the same time the air being permitted to pass freely through the apparatus and around the eggs, whereby the eggs are kept fresh for a long time.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. In an apparatus, for storing and preserving eggs, the combination of a suitable support, the frames pivotally mounted in the support, a longitudinally-movable bar formed with holes or slots, pins or rods projecting from the pivoted frames and engaging in said holes or slots, and means for moving said bar longitudinally for tipping the frames on their pivots; the holes or slots in the bar being expanded or increased in vertical width from the inner face adjacent to the pivoted frames toward the outer face of the bar, to allow for the free movement of the pins or rods, substantially as set forth.

2. In an apparatus for storing and preserving eggs, the combination of a suitable supporting-framework, a series of small frames pivotally mounted in said framework, the egg-trays supported upon the pivoted frames, suitable fastening devices for securing the trays in place on the pivoted frames, and suitable means for tilting the pivoted frames, substantially as set forth.

3. In an apparatus for storing and preserving eggs, the combination of a suitable supporting-framework, pairs of inwardly-projecting pins on the framework, the small frame provided with suitable bearings resting upon said pins for pivotally supporting the frames, means for confining the frames on said pivot-pins, the egg-trays supported upon the pivoted frames, and clamping devices carried by the frames adapted to engage the trays and hold them securely in place, substantially as set forth.

4. In an apparatus for storing and preserving eggs, the combination of a suitable supporting-framework, a series of small frames pivoted therein, pins or rods projecting from the pivoted frames, a longitudinally-movable rod formed with holes or slots in which said pins or rods engage, a rack on said bar, a pinion engaging said rack, and means for operating said pinion, substantially as set forth.

5. In an apparatus for storing and preserving eggs, the combination of a suitable supporting-framework, a series of small frames pivotally mounted in said framework and having pins or rods projecting from them, a longitudinally-movable bar having holes or slots in which said pins or rods engage, a rack H′ carried by said bar, stops K formed on said rack, and a pinion meshing with said rack for operating the bar longitudinally, substantially as set forth.

6. In an apparatus for storing and preserving eggs, the combination of a suitable supporting-framework, two vertical series of small frames individually pivoted in parallel planes in said framework, pins or rods G projecting inwardly from the pivoted frames, the vertical parallel bars H formed with holes or slots *h* in which said pins or rods engage, racks H′ carried by bars H, the pinions j^2 meshing with said racks, and a handle J′ geared to the pinions for operating them.

THEODORE RUDOLPH CÆSAR CHRISTIANSON.

Witnesses:

CHARLES ALEXANDER CHRISTIANSON,
JANET GIBSON.

794 (Defendants' Exhibit P, Letters Patent No
F. H. Morgan, October 19, 1897.)

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Letters Patent:
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the frames, means for confining the frames on said pivot-pins, the egg-trays supported upon the pivoted frames, and clamping devices carried by the frames adapted to engage the trays and hold them securely in place, substantially as set forth.

4. In an apparatus for storing and preserving eggs, the combination of a suitable supporting-framework, a series of small frames pivoted therein, pins or rods projecting from the pivoted frames, a longitudinally-movable rod formed with holes or slots in which said pins or rods engage, a rack on said bar, a pinion engaging said rack, and means for operating said pinion, substantially as set forth.

5. In an apparatus for storing and preserving eggs, the combination of a suitable supporting-framework, a series of small frames pivotally mounted in said framework and having pins or rods projecting from them, a longitudinally-movable bar having holes or slots in which said pins or rods engage, a rack H′ carried by said bar, stops K formed on said rack, and a pinion meshing with said rack for operating the bar longitudinally, substantially as set forth.

6. In an apparatus for storing and preserving eggs, the combination of a suitable supporting-framework, two vertical series of small frames individually pivoted in parallel planes in said framework, pins or rods G projecting inwardly from the pivoted frames, the vertical parallel bars H formed with holes or slots *h* in which said pins or rods engage, racks H′ carried by bars H, the pinions j^2 meshing with said racks, and a handle J′ geared to the pinions for operating them.

THEODORE RUDOLPH CÆSAR CHRISTIANSON.

Witnesses:

CHARLES ALEXANDER CHRISTIANSON,

JANET GIBSON.

794 (Defendants' Exhibit P, Letters Patent No. 591,870 to F. H. Morgan, October 19, 1897.)

F. H. MORGAN.

INCUBATOR.

No. 591,870. Patented Oct. 19, 1897.

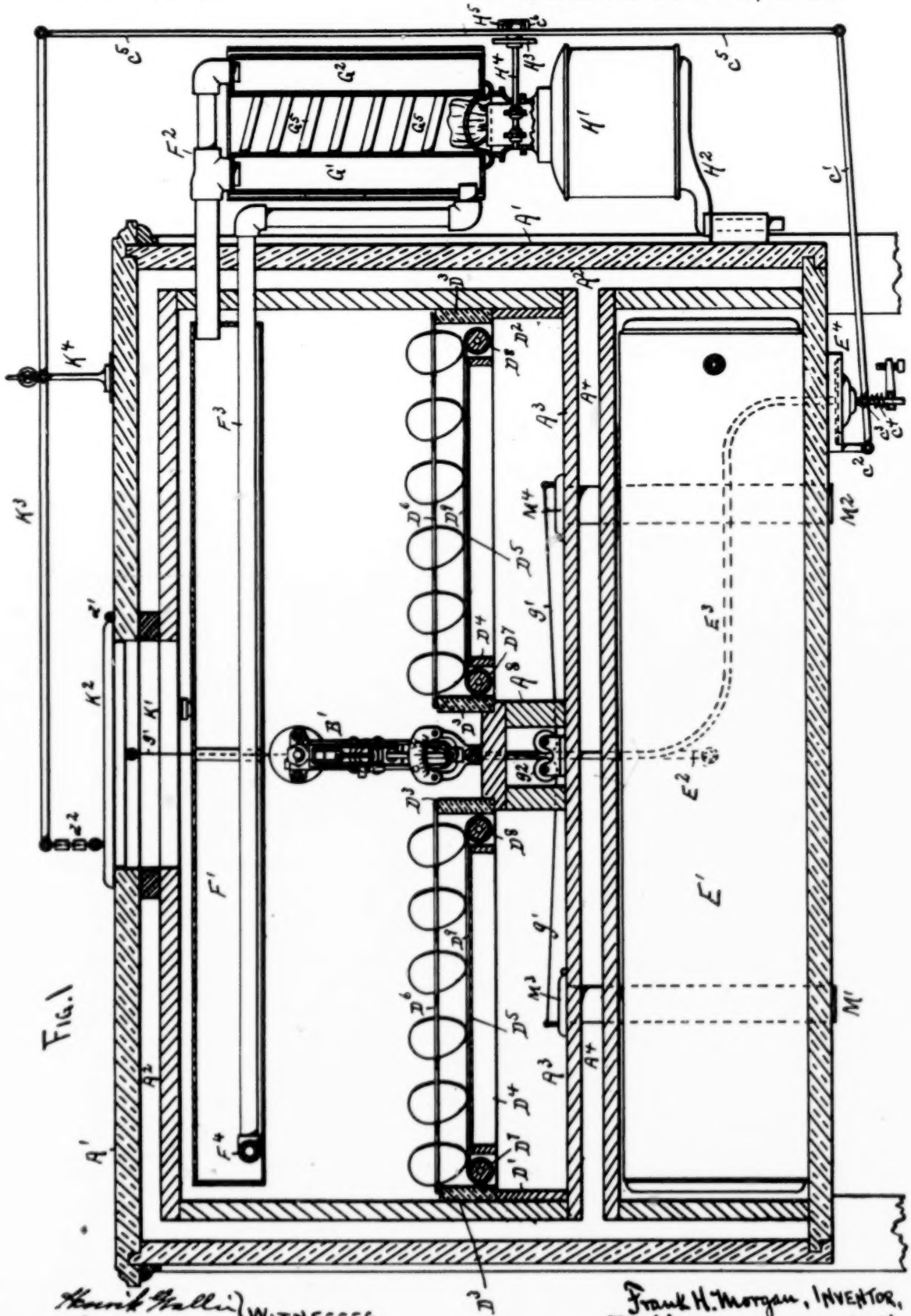


FIG. 1.

Witnesses:
Henrik Hallin
A. Lindahl.

Frank H. Morgan, Inventor,
By Charles N. Woodward Attn.

650

(No Model.) 3 Sheets—Sheet 2.

F. H. MORGAN.

INCUBATOR.

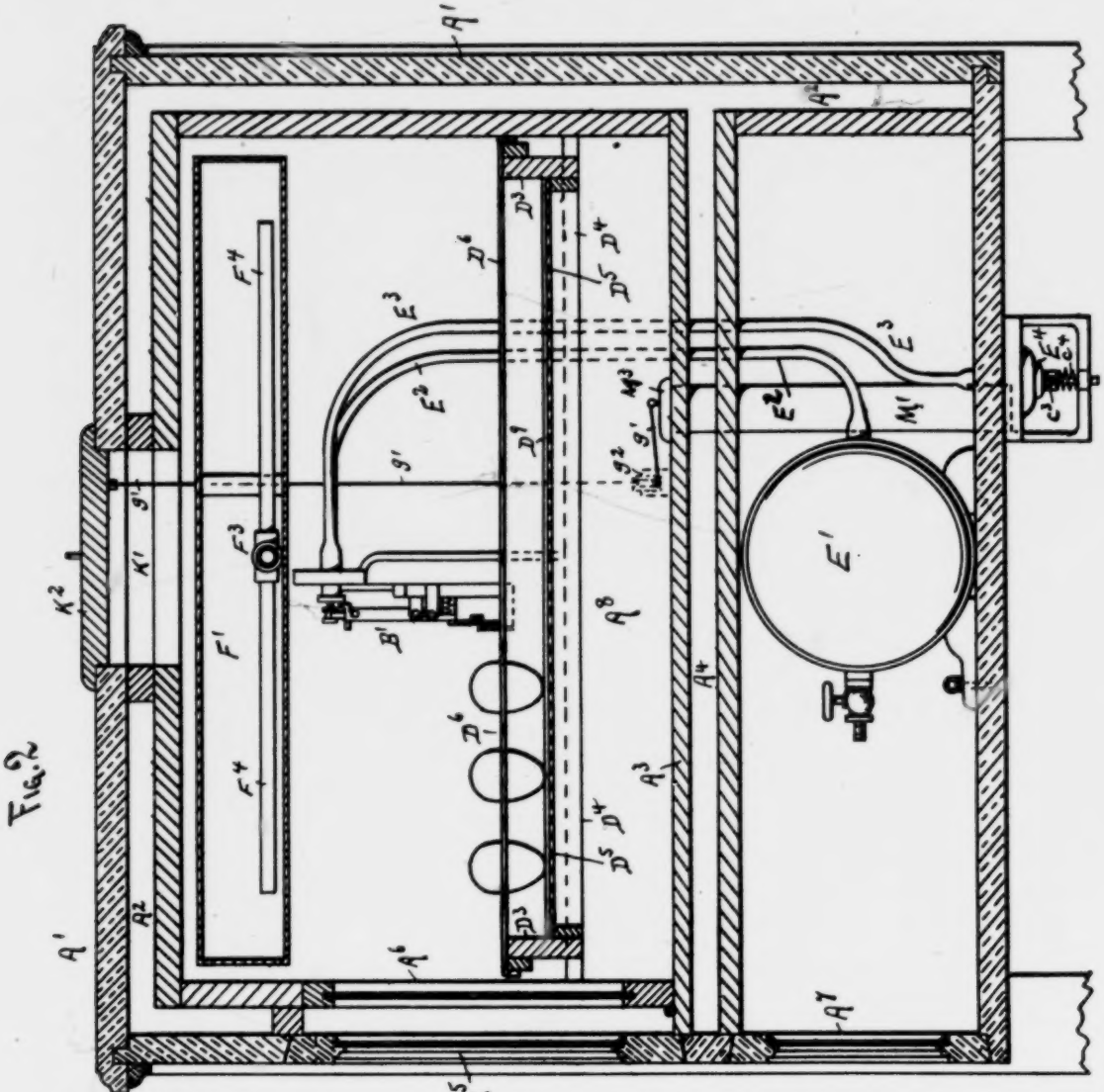
No. 591,870. Patented Oct. 19, 1897.

Fig. 4

Fig. 3

Fig. 5

Fig. 2



Witnesses:
Henrik Wallin
A. Lindahl

Frank H. Morgan, Inventor,
By Charles N. Woodward, Atty.

(No Model.) 3 Sheets—Sheet 3.

F. H. MORGAN.

INCUBATOR.

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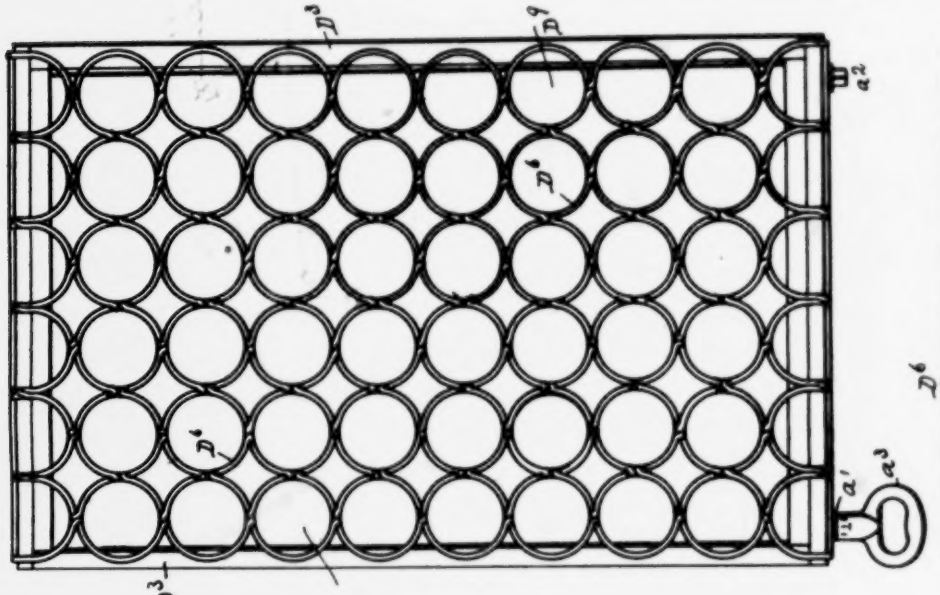

FIG. 7

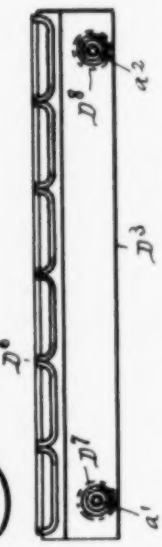

FIG. 8

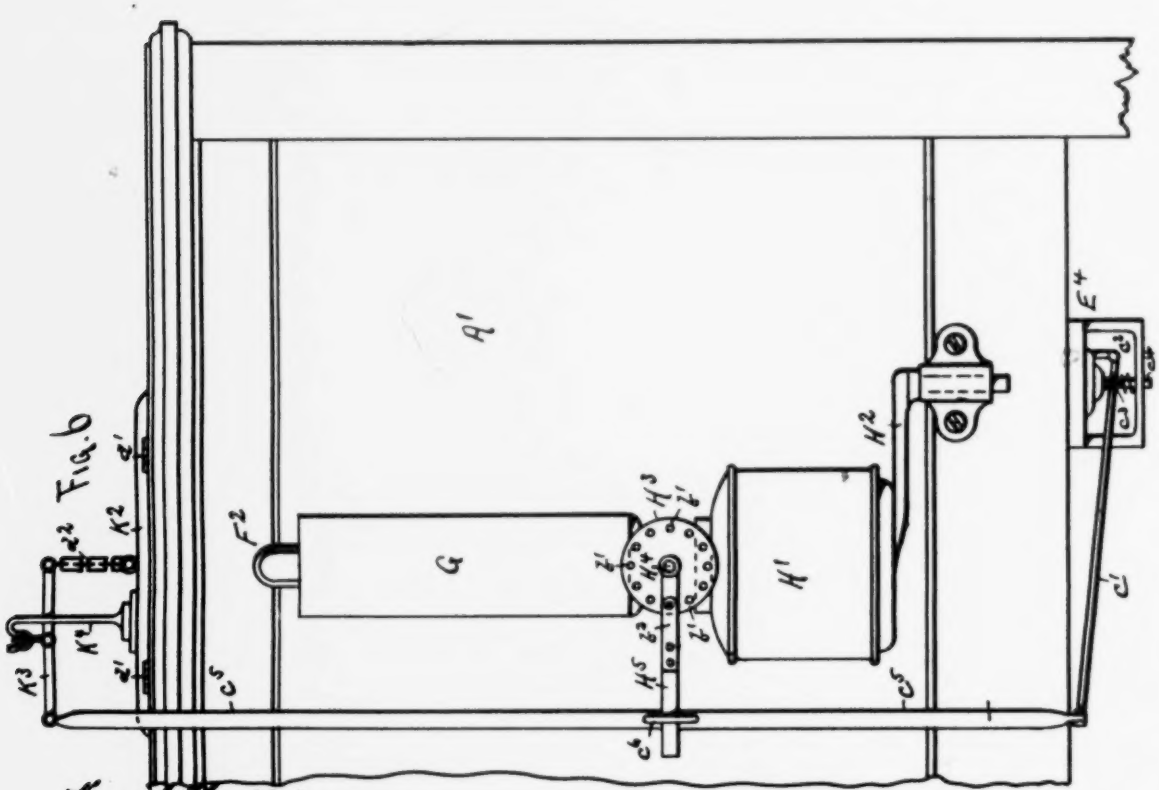

FIG. 6

Witnesses: Frank Wallis, A. Lindahl.

Frank H. Morgan, Inventor. By Charles H. Woodward, Atty.

UNITED STATES PATENT

FRANK H. MORGAN, OF ST. PAUL, MIN

INCUBATOR.

SPECIFICATION forming part of Letters Patent No. 591,870, d

Application filed January 20, 1896. Serial No. 576,111. (N

To all whom it may concern:

Be it known that I, FRANK H. MORGAN, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in Incubators, of which the following is a specification.

This invention relates to incubators; and it consists in the construction, combination, and arrangement of parts, as hereinafter shown and described, and specifically pointed out in the claims.

In the drawings, Figure 1 is a longitudinal sectional elevation, and Fig. 2 is a cross-sectional elevation. Fig. 3 is a longitudinal section, Fig. 4 is a cross-section, and Fig. 5 is a horizontal section, of the circulating-heater detached. Fig. 6 is an end elevation of a portion of the incubator from the outside. Fig. 7 is a plan view, and Fig. 8 is an end view, of one of the egg-supporting trays removed.

A′ is the outer casing, which is preferably made with double outside walls to form a dead-air space A^2 around the outside wall and top, and with a cross-partition A^3, also with a dead-air space A^4, a short distance up from the bottom, as shown. The front of the casing is provided with double glass doors A^5 A^6, while the front of the chamber below the cross-partition A^3 is likewise provided with a door A^7, as shown in Fig. 2. Rising from the center of the cross-partition A^3 is a hollow frame A^8, extending from front to rear, and adapted to support a thermostat B′, of any approved form. Resting by their outer edges upon ways D′ D^2 and by their inner edges upon the cross-frame A^8 are the egg-support-

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F. H. MORGAN.

INCUBATOR.

Patented Oct. 19, 1897.

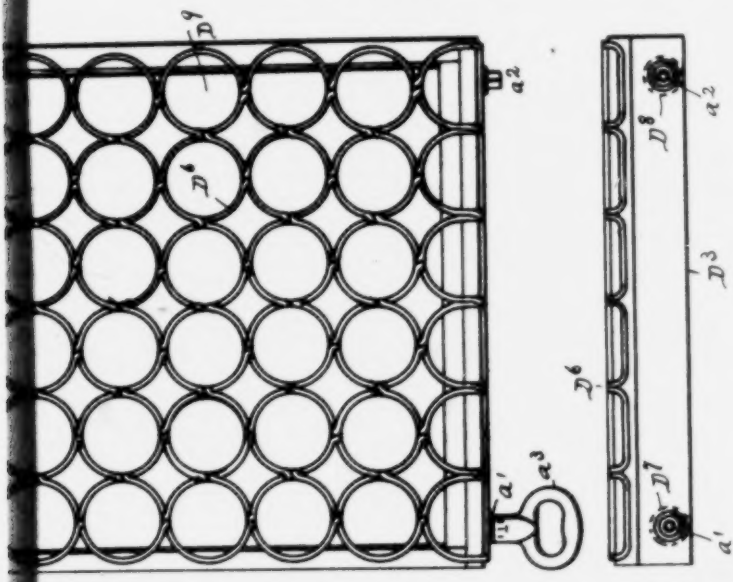
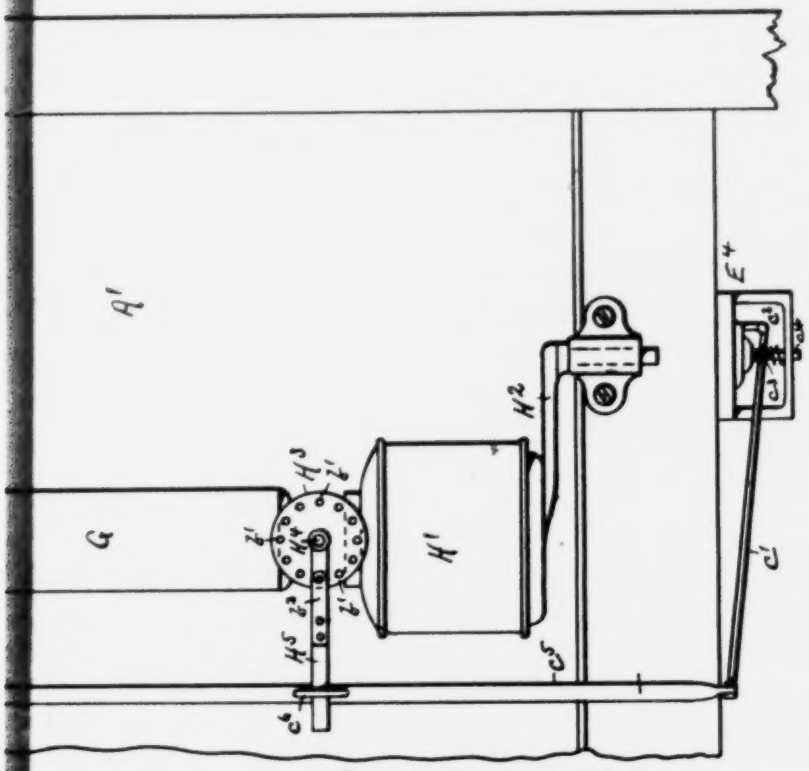


FIG. 8



NESSES.

Frank H. Morgan, INVENTOR.
By Charles H. Woodward, Atty.

UNITED STATES PATENT OFFICE.

FRANK H. MORGAN, OF ST. PAUL, MINNESOTA.

INCUBATOR.

SPECIFICATION forming part of Letters Patent No. 591,870, dated October 19, 1897.

Application filed January 20, 1896. Serial No. 576,111. (No model.)

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Within the space beneath the cross-partition A^3 is a compressed-air reservoir E′, connected by a tube E^2 to the inlet side of the thermostat B′, as shown in Fig. 2, while another tube E^3 leads from the outlet side of the thermostat to a diaphragm-governor valve E^4 beneath the casing A′, as shown.

Supported in the interior of the upper part of the casing A′ is a closed hot-water tank F′, and outside the casing A′, preferably at one end, is a circulating-heater consisting of two shells G′ G^2, connected by inclined cross-tubes G^5 and connected at their tops to the upper part of the hot-water tank F′ by piping F^2, while the lower end of one of the shells is likewise connected to the lower part of the tank by piping F^3, the latter extended into the tank along its lower part and ending in a cross-head pipe F^4, so that the water before entering the piping F^3 must traverse the whole length of the tank. By this means heat applied to the shells G′ G^2 will cause the water

Through the top of the casing A′ an opening K′ is formed and covered by a door or lid K^2, hinged at one side at d' and connected by a chain d^2, or other means, to one end of a lever K^3, the latter supported pivotally by a standard K^4 from the top of the casing A′, as shown.

c' is a lever pivoted by one end to a hanger c^2 from the diaphragm-valve E^4, and pivoted at c^3 to the stem c^4 of the valve, and projecting outward beyond the casing A′, and connected at its longer end by a rod c^5 to the outer end of the lever K^3, as shown. The lever H^5 projects past the rod c^5, and is loosely connected thereto by a strap or loop c^6, so that any rising or falling movement of the rod c^5 will carry the lever H^5 with it.

Fitting down through the cross-partition A^3, and also through the bottom of the casing A′, are tubes M′ M^2, open at their ends to form connections between the interior of the casing A′ and the open air. The upper ends of these tubes M′ M^2 are covered by hinged valves M^3 M^4, the latter connected by cords g', running over pulleys g^2 to the lid K^2, as shown, so that when the lid is lifted the valves M^3 M^4 will likewise be opened.

The thermostat B′ being set to operate at any predetermined temperature, when that point is reached, the valves of the thermostat will permit a supply of compressed air to pass from the tube E^2, leading from the receiver E′, to the tube E^3, leading to the valve E^4, which by expanding will depress the lever c', which will, through the rod c^5 and lever K^3, raise the lid K^2 and permit the hot air to escape. This will continue until the temperature has fallen to a sufficient extent to cause the thermostat to again close its valves and shut off the supply of compressed air, and thus permit the valve E^4 to collapse and release the levers c' K^3 and rod c^5, and permit the lid K^2 to fall shut.

The upward motion of the rod c^5 will carry the lever H^5 with it and correspondingly lower the lamp-flame and reduce the heat. Then when the return movement of the rod c^5 takes place, the lamp-flame will be again raised to its former position. At the same time that the lid is raised, as before stated, the valves M^3 M^4 will be opened, thus admitting a supply of fresh cool air to replace the hot air escaping from the opening K′.

The opening K′ being placed above the hot-water tank F′, and the latter projecting on all sides nearly to the interior of the casing A′, the escaping air must pass over the heated tank, and the outside air must likewise pass over the heated tank, so that no danger exists of an undue amount of cold air entering the chamber occupied by the egg-trays. By this simple means the temperature is perfectly controlled automatically, the variation of $\frac{1}{4}$° Fahrenheit being sufficient to cause the thermostat to operate, so that the temperature will never vary more than $\frac{1}{4}$° Fahrenheit.

As the wick of the lamp burns off, the circle of perforations in the disk H^3 enables the attendant to perfectly adjust the lever H^5 by setting the pawl b^3 into a new perforation.

The sizes of the tubing connecting the tank F′ and heater G′ G^2 will be graduated to correspond to the requirements of the circulation.

Having thus described my invention, what I claim as new is—

1. In an incubator, the combination of an inclosing casing, an outwardly-opening valve through the top of said casing, egg-holding trays supported within said casing, a closed water-tank supported in the interior of said casing near the top and beneath said valve so that the escaping air must pass over and around said tank, a heater outside said casing and connected into said tank, a lamp supported beneath said heater, a reservoir of compressed air, a flexible diaphragm connected by tubing with said compressed-air reservoir, a thermostat connected into said tubing and adapted to admit compressed air to the rear of said diaphragm, and a system of levers connecting said valve and the mechanism for adjusting the wick of said lamp, to the front of said diaphragm, whereby the rising and falling of the temperature within said casing will cause said valve to be opened or closed and the flame of said lamp correspondingly raised or lowered, and the temperature within the casing thereby automatically regulated, substantially as and for the purpose set forth.

2. In an incubator, the combination of an inclosing casing, an outwardly-opening valve through the top of said casing, an inwardly-opening valve through the bottom of said casing and connected to be actuated simultaneously with said upper valve, egg-holding trays supported within said casing, a closed water-tank supported in the interior of said casing near the top and beneath said upper valve, a heater connected into said tank, a lamp supported beneath said heater, a reservoir of compressed air, a flexible diaphragm connected by tubing with said compressed-air reservoir, a thermostat connected into said tubing and adapted to admit compressed air to the rear of said diaphragm, and a system of levers connecting said valves and the mechanism for adjusting the wick of said lamp, to the front of said diaphragm, whereby the rising and falling of the temperature within said casing will cause said connected valves to be opened or closed and the flame of the lamp correspondingly increased or decreased and the heated air allowed to escape from the upper part of the casing and the cooler air to enter through the bottom of the casing, substantially as and for the purpose set forth.

In testimony whereof I hereunto set my hand in the presence of two subscribing witnesses.

FRANK H. MORGAN.

Witnesses:
C. N. WOODWARD,
H. S. WEBSTER.

802 (Defendants' Exhibit P, Letters Patent No.
V. S. Bell, January 28, 1902.)

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lamp burns off, the cir-
cle of perforations in the disk H^3 enables the attendant to perfectly adjust the lever H^5 by setting the pawl b^3 into a new perforation.

The sizes of the tubing connecting the tank F′ and heater G′ G^2 will be graduated to correspond to the requirements of the circulation.

Having thus described my invention, what I claim as new is—

1. In an incubator, the combination of an inclosing casing, an outwardly-opening valve through the top of said casing, egg-holding trays supported within said casing, a closed water-tank supported in the interior of said casing near the top and beneath said valve so that the escaping air must pass over and around said tank, a heater outside said casing and connected into said tank, a lamp supported beneath said heater, a reservoir of compressed air, a flexible diaphragm connected by tubing with said compressed-air reservoir, a thermostat connected into said tubing and adapted to admit compressed air to the rear of said diaphragm, and a system of levers connecting said valve and the mechanism for adjusting the wick of said lamp, to the front of said diaphragm, whereby the rising and falling of the temperature within said casing will cause said valve to be opened or closed and the flame of said lamp correspondingly raised or lowered, and the temperature within the casing thereby automatically regulated, substantially as and for the purpose set forth.

2. In an incubator, the combination of an inclosing casing, an outwardly-opening valve through the top of said casing, an inwardly-opening valve through the bottom of said casing and connected to be actuated simultaneously with said upper valve, egg-holding trays supported within said casing, a closed water-tank supported in the interior of said casing near the top and beneath said upper valve, a heater connected into said tank, a lamp supported beneath said heater, a reservoir of compressed air, a flexible diaphragm connected by tubing with said compressed-air reservoir, a thermostat connected into said tubing and adapted to admit compressed air to the rear of said diaphragm, and a system of levers connecting said valves and the mechanism for adjusting the wick of said lamp, to the front of said diaphragm, whereby the rising and falling of the temperature within said casing will cause said connected valves to be opened or closed and the flame of the lamp correspondingly increased or decreased and the heated air allowed to escape from the upper part of the casing and the cooler air to enter through the bottom of the casing, substantially as and for the purpose set forth.

In testimony whereof I hereunto set my hand in the presence of two subscribing witnesses.

FRANK H. MORGAN.

Witnesses:
C. N. WOODWARD,
H. S. WEBSTER.

802 (Defendants' Exhibit P, Letters Patent No. 691,837 to V. S. Bell, January 28, 1902.)

656 No. 691,837. Patented Jan. 28, 1902.

V. S. BELL.

INCUBATOR.

(Application filed Mar. 28, 1901.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 3.

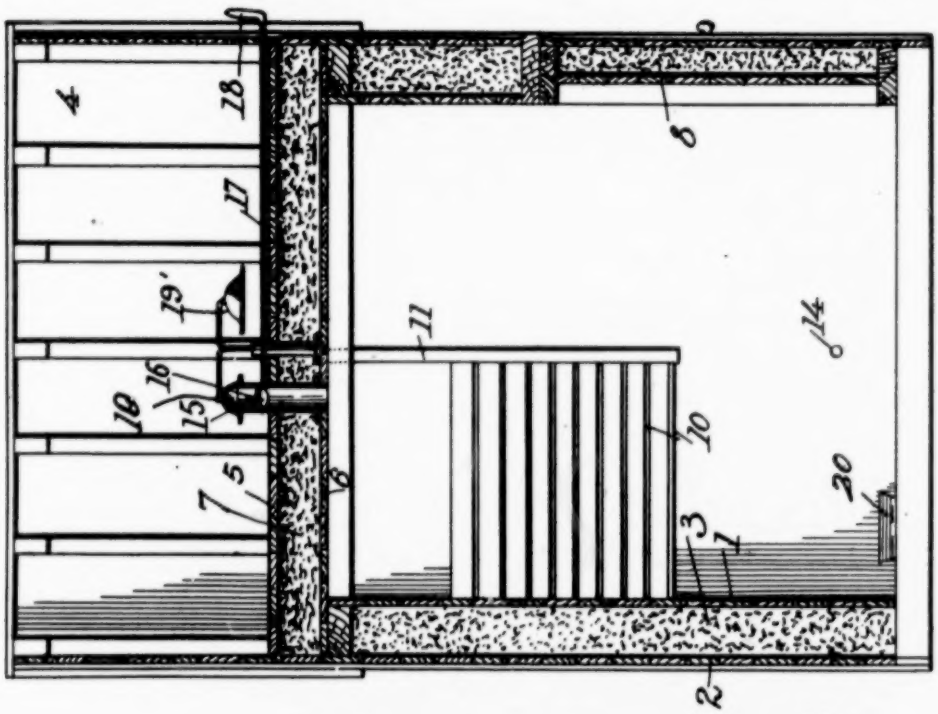
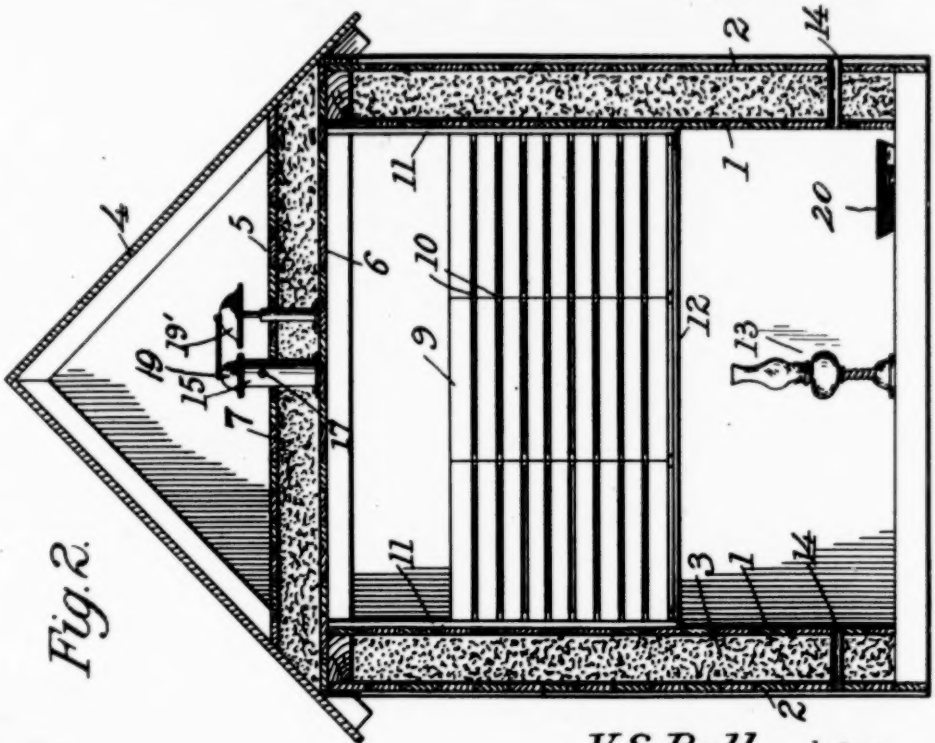


Fig. 2.



Witnesses:
J. B. Bowen.
H. G. Shepard.

V. S. Bell Inventor
by C. A. Snow & Co.
Attorneys

658

No. 691,837. Patented Jan. 28, 1902.

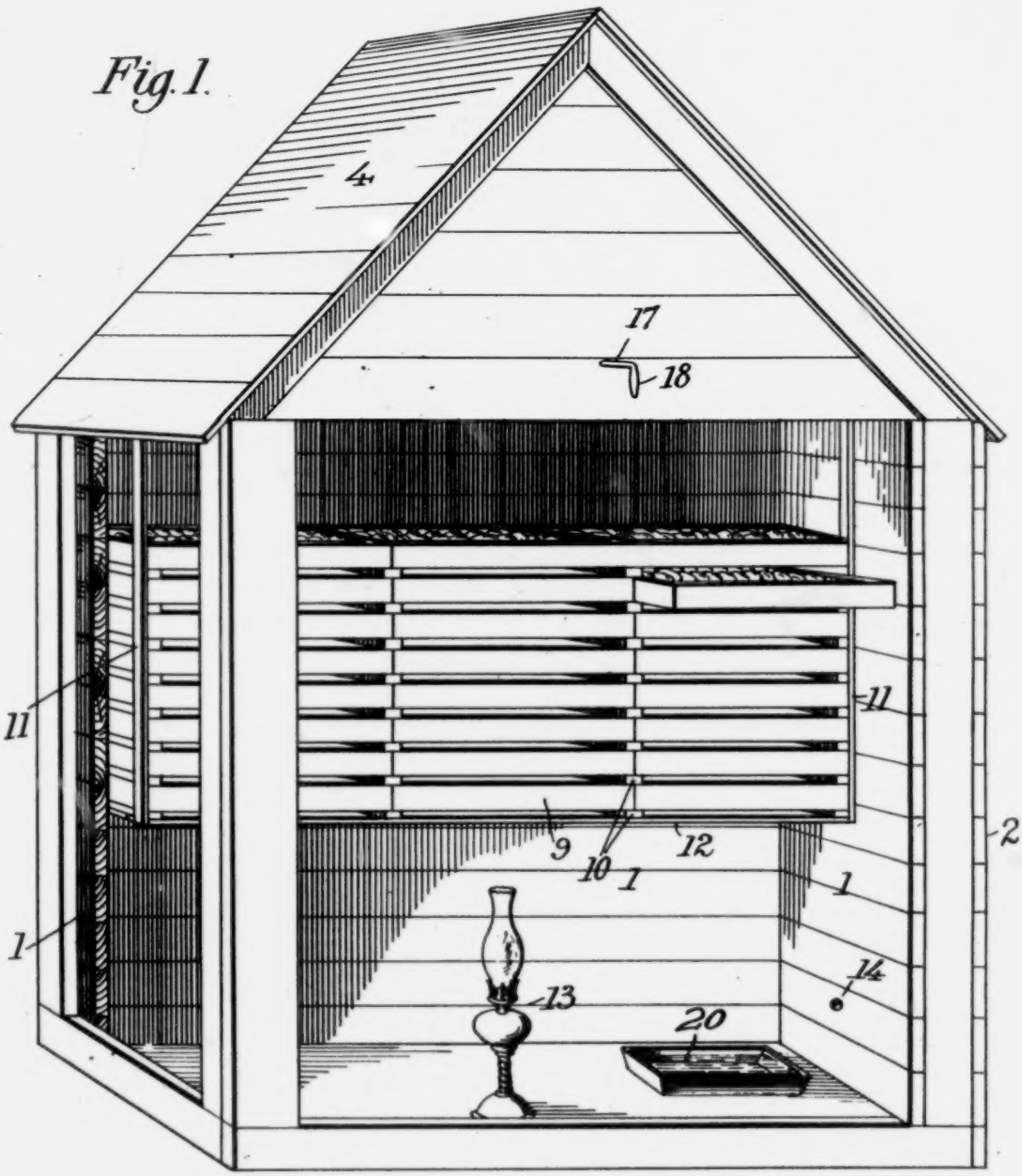
V. S. BELL.

INCUBATOR.

(Application filed Mar. 28, 1901.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.



Witnesses:
J. S. Bowen.
H. F. Shepard.

V. S. Bell Inventor
by C. A. Snow & Co.
Attorneys

UNITED STATES PATENT

VIRGIL S. BELL, OF HAYESVILLE, IOW

INCUBATOR.

SPECIFICATION forming part of Letters Patent No. 691,837, date

Application filed March 28, 1901. Serial No. 53,314. (No mode

To all whom it may concern:

Be it known that I, VIRGIL S. BELL, a citizen of the United States, residing at Hayesville, in the county of Keokuk and State of Iowa, have invented a new and useful Incubator, of which the following is a specification.

This invention relates to incubators, and has for its object to provide an improved device of this character which is of great capacity, so that an attendant may have access to the interior thereof for examining the eggs and for any other purpose without exposing the eggs to the outside temperature. It is furthermore designed to provide for effectively ventilating the interior of the device, so as to preserve a proper temperature for the unhatched eggs and also for the recently-hatched chickens, and at the same time prevent the incubator from being chilled too rapidly.

With these and other objects in view the present invention consists in the combination and arrangement of parts, as will be hereinafter more fully described, shown in the accompanying drawings, and particularly pointed out in the appended claim, it being understood that changes in the form, proportion, size, and minor details may be made within the scope of the claim without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings, Figure 1 is a perspective view of the improved incubator, the front and one side being removed to show the interior thereof. Fig. 2 is a transverse sectional view thereof. Fig. 3 is a sectional view taken at right angles to Fig. 2.

Like characters of reference designate corresponding parts in all of the figures of the drawings.

In carrying out the invention there is built a house or shed having inner and outer walls 1 and 2, that are separated a suitable distance, preferably six inches, and this intervening space is filled with loose earth 3 to form a heat-non-conducting filling, which will maintain the interior air moist. The building is also provided with a peaked roof 4, the ceiling having top and bottom walls 5 and 6, between which is held the filling of earth 7, so that the interior of the building may be entirely housed by ea
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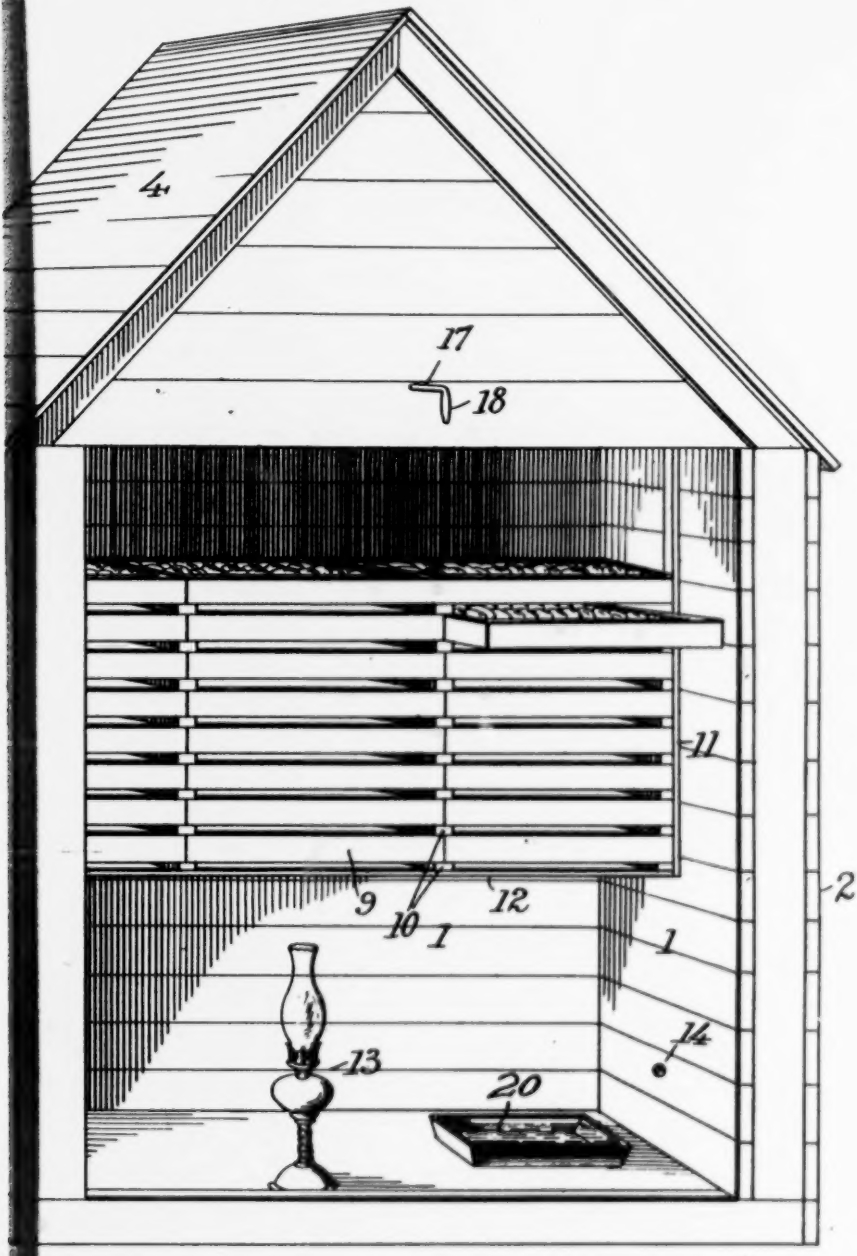
Patented Jan. 28, 1902.

V. S. BELL.

INCUBATOR.

(Application filed Mar. 28, 1901.)

2 Sheets—Sheet 1.



V. S. Bell Inventor

by C. A. Snow & Co.

Attorneys

VIRGIL S. BELL, OF HAYESVILLE, IOWA.

INCUBATOR.

SPECIFICATION forming part of Letters Patent No. 691,837, dated January 28, 1902.

Application filed March 28, 1901. Serial No. 53,314. (No model.)

To all whom it may concern:

Be it known that I, VIRGIL S. BELL, a citizen of the United States, residing at Hayesville, in the county of Keokuk and State of Iowa, have invented a new and useful Incubator, of which the following is a specification.

This invention relates to incubators, and has for its object to provide an improved device of this character which is of great capacity, so that an attendant may have access to the interior thereof for examining the eggs and for any other purpose without exposing the eggs to the outside temperature. It is furthermore designed to provide for effectively ventilating the interior of the device, so as to preserve a proper temperature for the unhatched eggs and also for the recently-hatched chickens, and at the same time prevent the incubator from being chilled too rapidly.

With these and other objects in view the present invention consists in the combination and arrangement of parts, as will be hereinafter more fully described, shown in the accompanying drawings, and particularly pointed out in the appended claim, it being understood that changes in the form, proportion, size, and minor details may be made within the scope of the claim without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings, Figure 1 is a perspective view of the improved incubator, the front and one side being removed to show the interior thereof. Fig. 2 is a transverse sectional view thereof. Fig. 3 is a sectional view taken at right angles to Fig. 2.

Like characters of reference designate corresponding parts in all of the figures of the drawings.

In carrying out the invention there is built a house or shed having inner and outer walls 1 and 2, that are separated a suitable distance, preferably six inches, and this intervening space is filled with loose earth 3 to form a heat-non-conducting filling, which will maintain the interior air moist. The building is also provided with a peaked roof 4, the ceiling having top and bottom walls 5 and 6, between which is held the filling of earth 7, so that the interior of the building may be entirely housed by earth-filled walls. Access is had to the interior of the shed through a suitable dirt-filled door 8, (shown in Fig. 3 of the drawings,) whereby an attendant may enter the building to inspect the same without exposing the eggs to the outer air for any considerable time.

It is designed to support the eggs in trays 9, arranged in groups, the trays of each group being disposed one above the other, so that the ascending heat may affect all of the eggs. For the support of the trays there is provided a plurality of cleats or bars 10, which are arranged in vertical series and project outwardly from one side of the shed, to which they are connected in any suitable manner. It will be understood that the series of cleats are arranged at regular intervals, so as to slidably support the egg-trays, and the intermediate cleats are wide enough to support the adjacent edges of opposite trays; also, the outer ends of the opposite end series are braced by a hanger 11, pendent from the ceiling of the building, and the lowermost cleats are connected by a cross-bar 12, thus forming a strong and convenient frame for the support of the egg-trays. By this arrangement there is a space between the trays equal to the thickness of a cleat, and these openings or spaces will permit the chickens as they are hatched to escape from the trays and reach the floor of the shed; also, the cleats which support the trays permit the latter to be readily drawn outwardly or slid inwardly to remove or replace them.

The interior of the shed or building is heated by means of a lamp 13, placed upon the floor of the shed, and fresh air is supplied through pipes or inlet-passages 14, formed through the filled walls and adjacent to the bottom of the building, so that the incoming air may become properly heated before rising into contact with the eggs, which are supported at a suitable distance above the inlet-openings.

For ventilating the shed there is provided a hot-air-escape pipe or passage 15, extending through the ceiling of the shed and forming a communication between the interior thereof and the air-space above the ceiling. The peaked roof and the single extensions of the front and rear walls form an upper com-

partment and are provided with sufficient cracks to permit the hot air to escape from this upper chamber or compartment, which thereby partially confines the escaping hot air, causing the same to escape slowly and preventing the lower egg-receiving compartment from becoming suddenly chilled. A damper 16 is located within the escape-pipe between the ends thereof and at a point above the double ceiling, and it is operated by a rod or stem 17, located within the upper chamber or compartment and extending through the front wall of the same and provided with an exteriorly-arranged handle for enabling the damper to be readily controlled. The damper is normally open to permit the free upward passage of the heated air through the ventilating-passage; but the latter is normally closed at a point above the damper by means of an outer terminal valve 19, which is controlled by a thermostat 19′, adapted to open the valve when the air in the incubator has reached a predetermined degree of temperature. The thermostat may be of any desired construction, and the purpose of the two valves and their particular arrangement is to permit the inner valve to be closed should it be desired to cut off the escape of the hot air when the outer valve has been opened by the thermostat.

The incubator is an outhouse or building, and when it is not in use as an incubator it may be employed for a variety of other purposes, such as a storehouse for various articles.

By reason of the fact that the loose earth is confined between opposite walls it will retain its moisture, and additional moisture may be supplied by a water-pan 20, placed upon the floor.

It will be understood that the filling between the inner and outer walls of the incubator may be sawdust, cinders, or other suitable material, and instead of an ordinary illuminating-lamp an oil or gasolene stove may be used, and, in fact, any preferred or particularly-adapted means of heating may be employed.

What is claimed is—

An incubator comprising a housing, a double-walled lower compartment provided with a double ceiling, said housing being also provided with an upper compartment having single walls and provided with cracks or apertures forming escape-openings for hot air, whereby the said upper compartment is adapted to confine partially the escaping hot air and cause the same to escape slowly to prevent the lower compartment from becoming chilled too quickly, a packing of heat-non-conducting material arranged at the walls and ceiling, egg-trays located in the lower compartment, a heat-generating device located below the trays, a short hot-air escape extending through the ceiling and permitting the hot air to pass from the lower compartment and terminating therein, a valve located at the upper end of the hot-air escape and provided with a thermostat to open it automatically, and a damper located in the hot-air escape at a point between the ceiling and the said valve and provided with means for operating it from the exterior to enable the escape of air to be cut off when the upper valve is open, substantially as and for the purpose described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

VIRGIL S. BELL.

Witnesses:
EDWARD DUREE,
A. C. JACOBS.

808 (Defendants' Exhibit P, Letters Patent No. O. P. Scott, September 23, 1902.)

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In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

VIRGIL S. BELL.

Witnesses:
EDWARD DUREE,
A. C. JACOBS.

808 (Defendants' Exhibit P, Letters Patent No. 709,650 to O. P. Scott, September 23, 1902.)

No. 709,650. Patented Sept. 23, 1902.

O. P. SCOTT.

INCUBATOR.

(Application filed Sept. 23, 1901.)

(No Model.) 2 Sheets—Sheet 1.

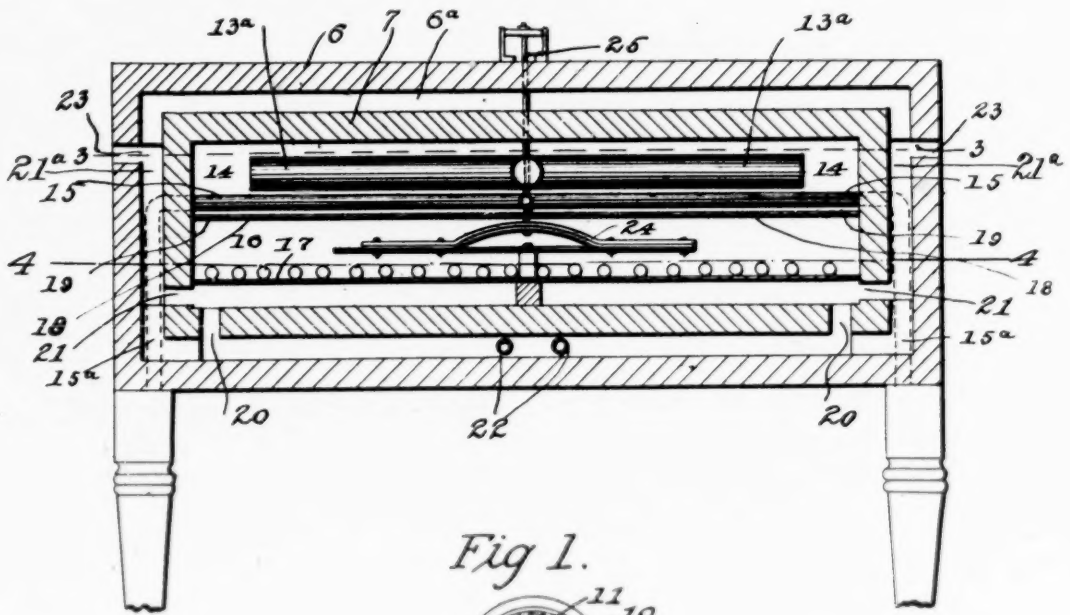

Fig 1.

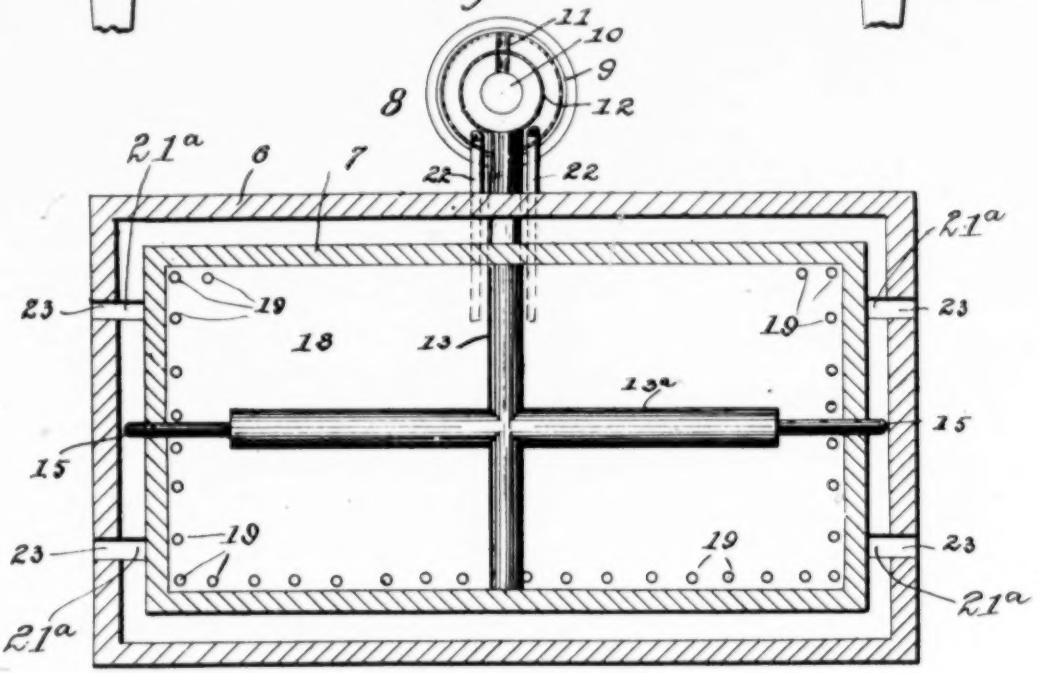

Fig. 3.

WITNESSES:

F. A. Barron

O. E. Murray.

INVENTOR

Oliver P. Scott

BY

Milo B. Stevens & Co.

ATTORNEYS.

No. 709,650. Patented Sept. 23, 1902.

O. P. SCOTT.

INCUBATOR.

(Application filed Sept. 23, 1901.)

(No Model.) 2 Sheets—Sheet 2.

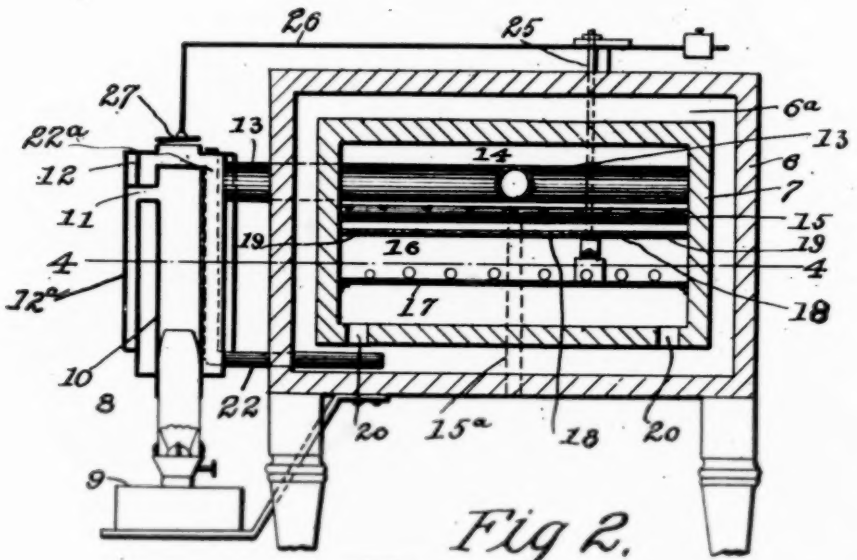

Fig 2.

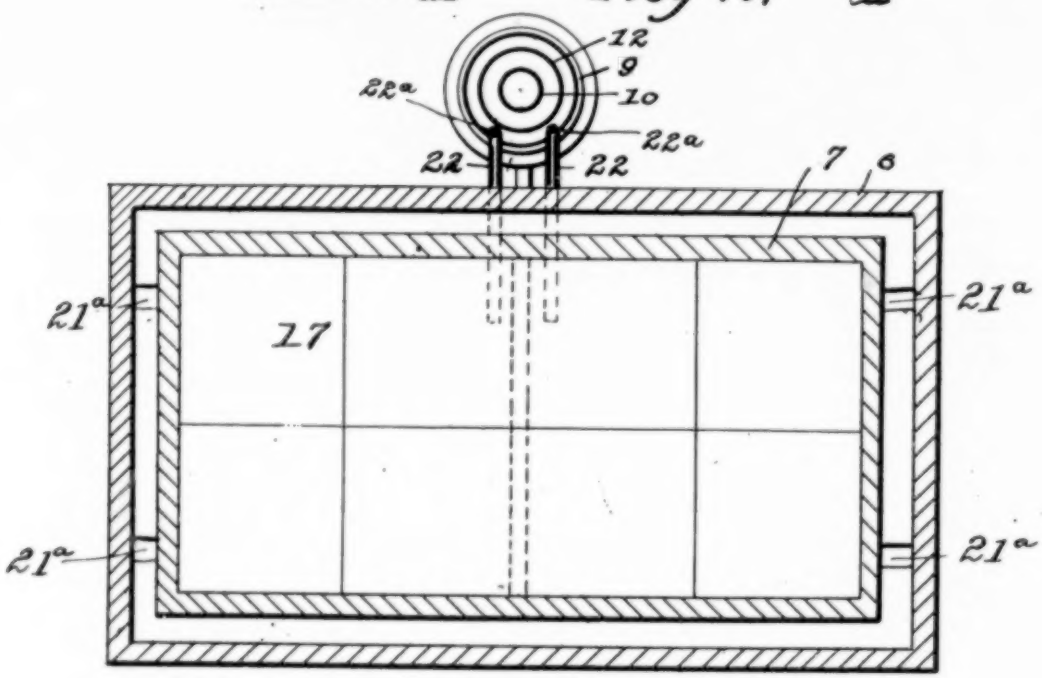

Fig. 4.

WITNESSES:

F. A. Farrow

O. E. Murray

INVENTOR

Oliver P. Scott

BY

Milo B. Stevens & Co.

ATTORNEYS.

UNITED STATES PATENT

OLIVER P. SCOTT, OF CHICAGO, ILL

INCUBATOR.

SPECIFICATION forming part of Letters Patent No. 709,650, da

Application filed September 23, 1901. Serial No. 76,191. (N

To all whom it may concern:

Be it known that I, OLIVER P. SCOTT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Incubators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

This invention relates to incubators. Its object is to provide improved means for regulating the temperature of the air in the incubator and also to improve the quality of the air admitted with respect to both the amount of oxygen and the amount of moisture therein. A proper supply of oxygen and moisture in the air admitted to incubators is essential, and the former is supplied by an improved construction whereby the air does not pass through or in contact with the heater-flame, so that no fumes pass into the egg-chamber, and a proper amount of moisture is supplied by admitting fresh cold air otherwise than through the heater, whereby the deficiency of moisture in the air which has passed through the heater is corrected.

The invention further comprises separated air and egg chambers having therebetween a plate with perforations near the outer edges thereof, together with hot and cold air inlet pipes in the air-chamber having therein a number of small discharge-openings in several parts of the chamber, whereby the hot and cold air currents are thoroughly mixed in the air-chamber before reaching the eggs and the air is delivered into the egg-chamber near the corners and outer parts thereof. When a hot-air pipe is passed directly into or through an egg-chamber, the parts distant from the pipe are liable to be colder than the nearer parts, so that an equable temperature is not preserved.

A further object of my invention is to improve the circulation of air through the incubator by passing some of the outlet-pipes under the influence of the heater, so as to accelerate the delive
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Patented Sept. 23, 1902.

O. P. SCOTT.

INCUBATOR.

(Application filed Sept. 23, 1901.)

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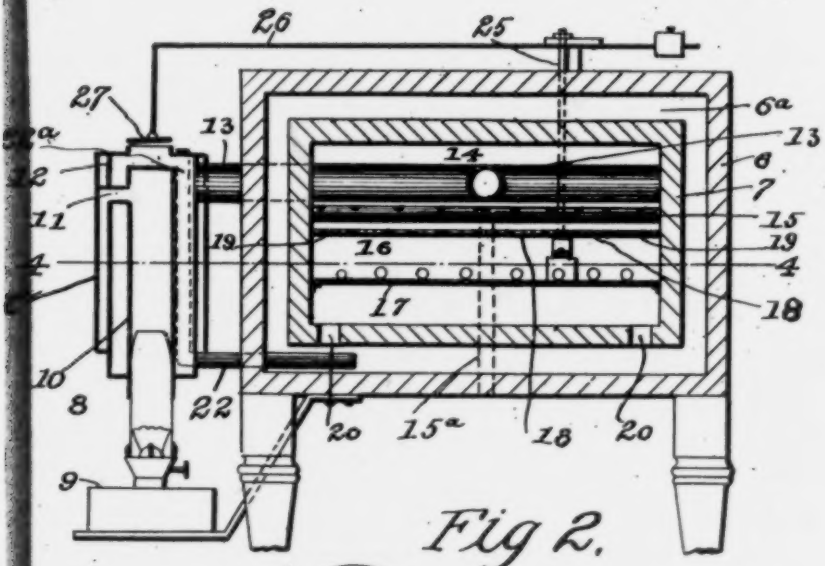

Fig 2.

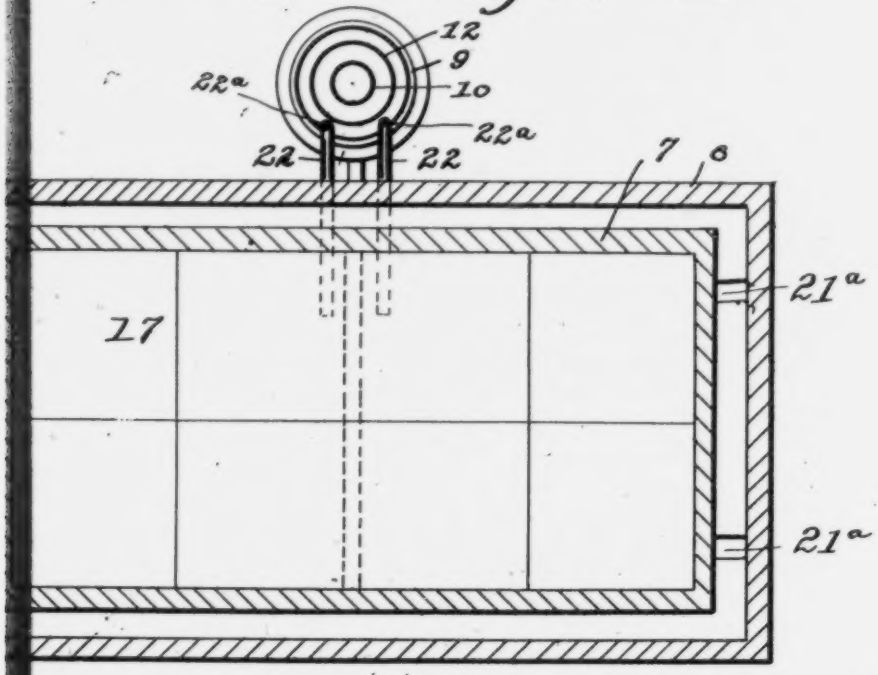

Fig. 4.

ES:

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urray

INVENTOR

Oliver P. Scott

BY

Milo B. Stevens & Co.

ATTORNEYS.

UNITED STATES PATENT OFFICE.

OLIVER P. SCOTT, OF CHICAGO, ILLINOIS.

INCUBATOR.

SPECIFICATION forming part of Letters Patent No. 709,650, dated September 23, 1902.

Application filed September 23, 1901. Serial No. 76,191. (No model.)

To all whom it may concern:

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The invention further comprises separated air and egg chambers having therebetween a plate with perforations near the outer edges thereof, together with hot and cold air inlet pipes in the air-chamber having therein a number of small discharge-openings in several parts of the chamber, whereby the hot and cold air currents are thoroughly mixed in the air-chamber before reaching the eggs and the air is delivered into the egg-chamber near the corners and outer parts thereof. When a hot-air pipe is passed directly into or through an egg-chamber, the parts distant from the pipe are liable to be colder than the nearer parts, so that an equable temperature is not preserved.

A further object of my invention is to improve the circulation of air through the incubator by passing some of the outlet-pipes under the influence of the heater, so as to accelerate the delivery of air by creating a suction from the egg-chamber.

With these and other objects in view an embodiment of my invention is hereinafter described, and is illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal vertical section. Fig. 2 is a vertical cross-section. Fig. 3 is a horizontal section on the line 3 3 of Fig. 1, and Fig. 4 is a horizontal section on the line 4 4 of Figs. 1 and 2.

Referring particularly to the drawings, the outer case of the incubator is indicated at 6, and the inner case at 7, having the space 6^a between which may be filled, except between the bottoms of the casings, with cotton, mineral wool, or other suitable non-conductor of heat. The heater is indicated at 8, comprising a lamp 9, the chimney of which communicates with an interior cylinder 10, which is closed at the top. A pipe 11 communicates with this cylinder and conducts the fumes from the lamp without the cylinder or drum 12 into a superheating outer drum 12^a, whence it passes down and is discharged from the bottom thereof into the outer air. The drum 12 forms a heating-chamber for the pure air entering the drum at the bottom thereof. A pipe 13, extending through the inner and outer casings, conducts the heated air into an air-mixing chamber 14, located in the top of the inner casing. The pipe 13 has lateral branches 13^a, and the pipe and its branches are provided with perforations through which the air is discharged and distributed, as will be understood.

Within the mixing-chamber 14, below and in close proximity to the hot-air pipe 13, is a cold-air pipe 15. The ends of this pipe extend through the end or side walls of the inner casing and are provided with vertical extensions 15^a, which communicate through the bottom of the outer casing with the outside air. The pipe 15 is provided with lateral extensions and perforations similar to the hot-air pipe.

The egg-chamber 16 is situated in the lower part of the inner casing and is provided with the usual egg-trays 17. A sheet-iron or other metal plate separates the mixing-chamber 14 from the egg-chamber 16. This plate is indi-

cated at 18 and at the ends and outer edge thereof is provided with perforations 19. By this construction the hot and cold air discharged from the pipes in the mixing-chamber is mixed or commingled and then passes through the perforations downwardly into the egg-chamber. Inasmuch as the perforations are at the edge of the plate, the air is delivered at the edges and corners of the egg-chamber, whereby a more equable temperature is preserved therein. After having passed over the eggs the stale air is discharged through openings 20 in the bottom of the inner case into the space between the bottoms of the casings and through openings 21 into passages 21^a between the sides of the casings, which passages communicate with the openings 23 in the outer casing. Pipes 22 extend from the space between the casing-bottoms outwardly through the outer casing in proximity to the heater and extend thence upwardly through the drum thereof, as indicated at 22^a. By this means the air in the pipes is heated, causing an accelerated discharge and effectively promoting the circulation of air through the incubator. The air escaping through the openings 21 passes by a normal flow through the passages 21^a between the casings and is discharged through the openings 23 in the outer casing.

The incubator is also provided with a suitable thermostat 24, connected by a rod 25 with a lever 26, by which a damper 27 to the drum is operated.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is—

1. In an incubator, in combination, outer and inner casings, air-mixing and egg chambers in the inner casing, a perforated air-spreading partition between said chambers, to deliver air from the mixing-chamber to various parts of the egg-chamber, and hot and cold air supply pipes having numerous adjacent discharge-openings in remote parts of the mixing-chamber.

2. In an incubator, in combination, a casing, an egg-chamber and an air-mixing chamber therein, hot-air and cold-air inlet pipes communicating with the mixing-chamber, and a perforated partition between the mixing-chamber and the egg-chamber.

3. In an incubator, in combination, an egg-chamber and an air-chamber therein, an inlet air-pipe having a number of small openings in remote parts of the air-chamber, and a partition between the egg-chamber and the air-chamber having openings therein only near the outer edge thereof.

4. In an incubator, in combination, a casing, a perforated air-distributing partition therein forming air and egg chambers, and foraminate hot and cold air supply pipes extending in proximity to remote parts of the air-chamber.

5. An incubator comprising inner and outer casings spaced apart, an egg-chamber in the inner casing, a heater, an air-supply pipe extending therefrom into the inner casing, air-discharge openings in the bottom of the inner casing communicating with the space between the bottoms of the casings, a tube extending from said space to the heater whereby the air is heated to accelerate the discharge, and independent discharge-passages extending from the egg-chamber through the casings.

In testimony whereof I affix my signature in presence of two witnesses.

OLIVER P. SCOTT.

Witnesses:
NELLIE FELTSKOG,
HARRY G. BATCHELOR.

814 (Defendants' Exhibit P, Letters Patent No.
F. C. Perkins, December 1, 1903.)

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5. An incubator comprising inner and outer casings spaced apart, an egg-chamber in the inner casing, a heater, an air-supply pipe extending therefrom into the inner casing, air-discharge openings in the bottom of the inner casing communicating with the space between the bottoms of the casings, a tube extending from said space to the heater whereby the air is heated to accelerate the discharge, and independent discharge-passages extending from the egg-chamber through the casings.

In testimony whereof I affix my signature in presence of two witnesses.

OLIVER P. SCOTT.

Witnesses:
NELLIE FELTSKOG,
HARRY G. BATCHELOR.

814 (Defendants' Exhibit P, Letters Patent No. 745,458 to F. C. Perkins, December 1, 1903.)

668

No. 745,458. PATENTED DEC. 1, 1903.

F. C. PERKINS.

ELECTRICAL INCUBATOR.

APPLICATION FILED JULY 30, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

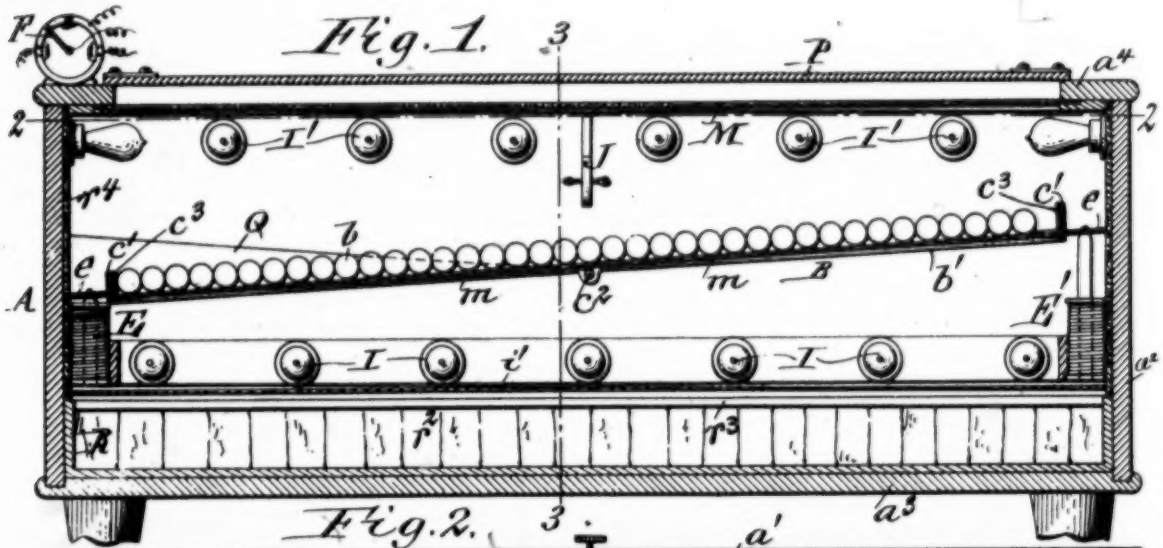


Fig. 2.

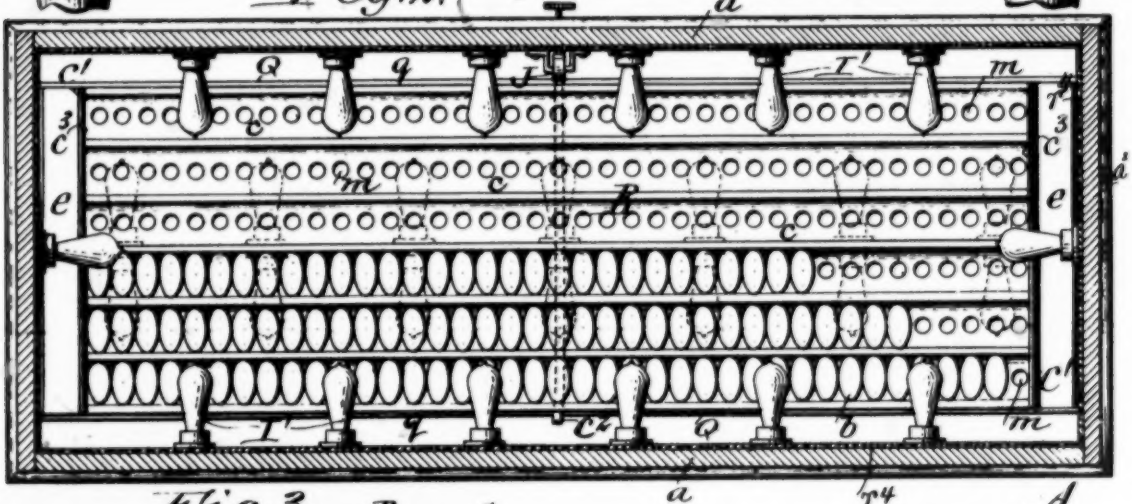


Fig. 3.

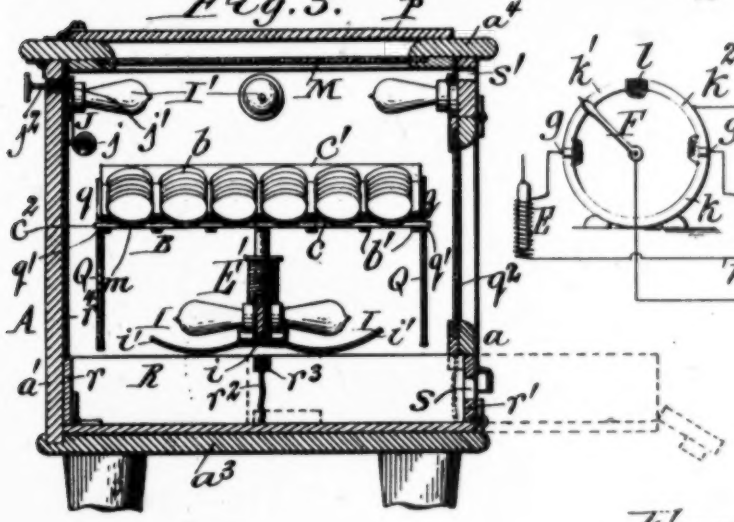
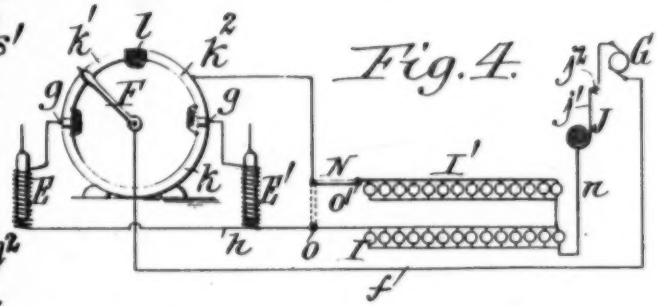


Fig. 4.



Witnesses:
Louis A. Gratz.
Robert Weitknecht.

Frank C. Perkins,
Inventor
By Geyer & Popp
Attorneys

670

F. C. PERKINS.

ELECTRICAL INCUBATOR.

APPLICATION FILED JULY 30, 1903.

NO MODEL.

2 SHEETS—SHEET 2

Fig. 5.

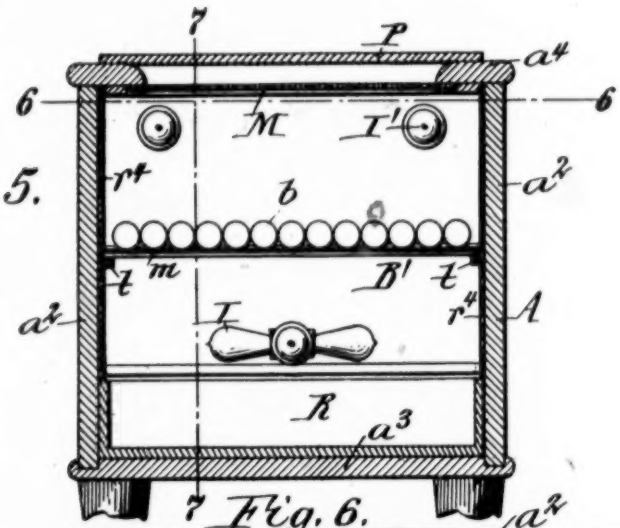


Fig. 6.

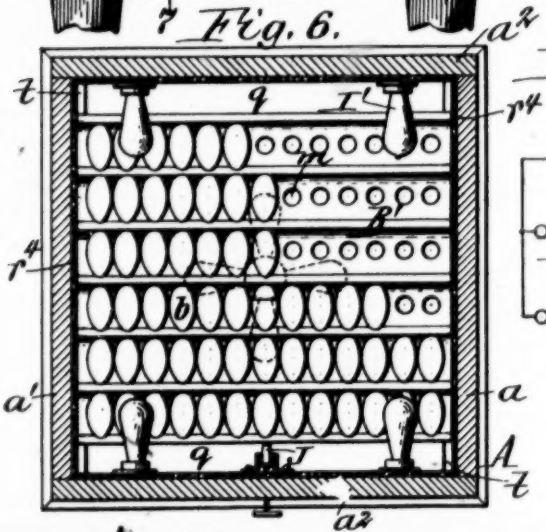


Fig. 8.

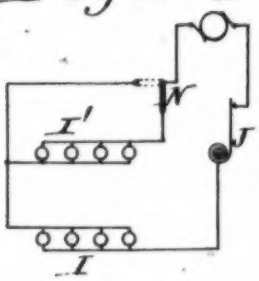


Fig. 9.

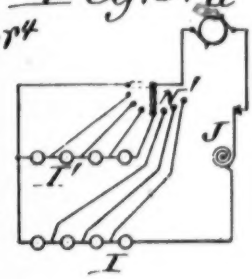


Fig. 7

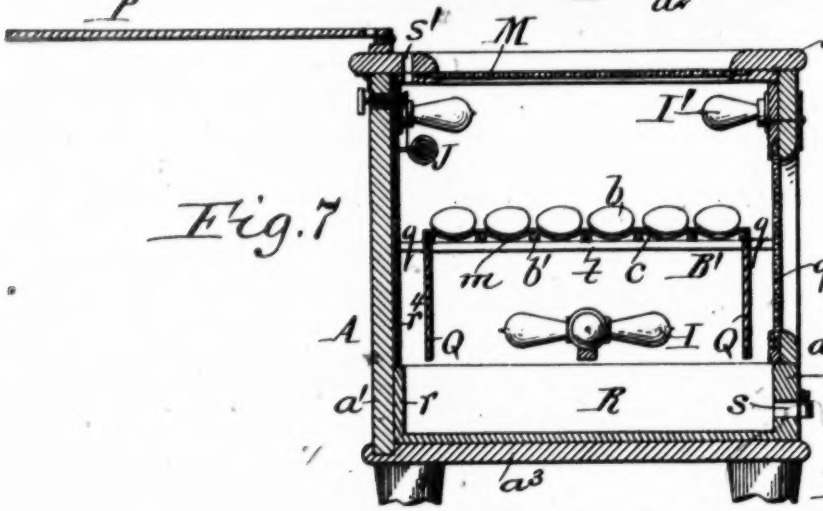


Fig. 11.

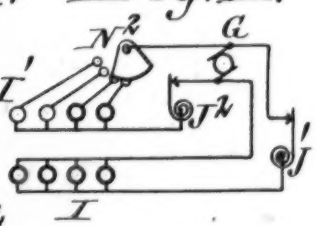
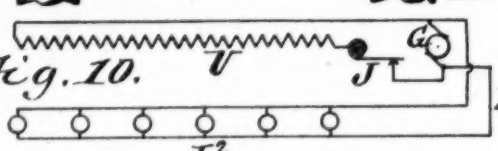


Fig. 10.



Witnesses:
Louis W. Gratz.
Robert Weitkenecht.

Frank C. Perkins,
Inventor
By Geyer & Popp
Attorneys

No. 745,458. P

UNITED STATES PATENT

FRANK CLINTON PERKINS, OF BUFFALO, N

ELECTRICAL INCUBATOR.

SPECIFICATION forming part of Letters Patent No. 745,458, d

Application filed July 30, 1903. Serial No. 167,574. (No m

To all whom it may concern:

Be it known that I, FRANK CLINTON PERKINS, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Electrical Incubators, of which the following is a specification.

The principal object of this invention is to provide an incubator in which the eggs are hatched and the chicks are kept warm by means of an electric heater which, together with a thermostatic regulator, is arranged directly within the incubating-chamber.

Another object of this invention is to provide simple automatic means for turning the eggs and also cooling the same periodically.

This invention has the further object to so organize the incubator that the eggs may be readily tested without removing the same from the incubator.

In the accompanying drawings, consisting of two sheets, Figure 1 is a longitudinal sectional elevation of an incubator embodying my improvements. Fig. 2 is a horizontal section thereof in line 2 2, Fig. 1. Fig. 3 is a vertical transverse section in line 3 3, Fig. 1. Fig. 4 is a diagrammatic view showing one arrangement of wiring the electrical appliances of the incubator. Fig. 5 is a vertical section showing a modification of my improved incubator. Fig. 6 is a horizontal section thereof in line 6 6, Fig. 5. Fig. 7 is a vertical section in line 7 7, Fig. 5. Figs. 8, 9, 10, and 11 are diagrammatic views showing modifications of the electrical appliances of the incubator.

Similar letters of reference indicate corresponding parts throughout the several views.

Referring to Figs. 1 to 4, A represents the inclosing casing of the incubator, which preferably consists of longitudinal side walls a a', transverse end walls a^2, a bottom a^3, and a top a^4. Within this chamber, between the top and bottom thereof, is arranged the rack or tray B, upon which the eggs b are supported while being hatched. This tray preferably consists of a plurality of longitudinal bars b', which are arranged lengthwise and parallel side by side in the incubating-chamber and connected by a covering consisting, preferably, of porous or perforated material, such as cloth or woven wire, which permits the passage of heat. Th
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F. C. PERKINS.

ELECTRICAL INCUBATOR.

APPLICATION FILED JULY 30, 1903.

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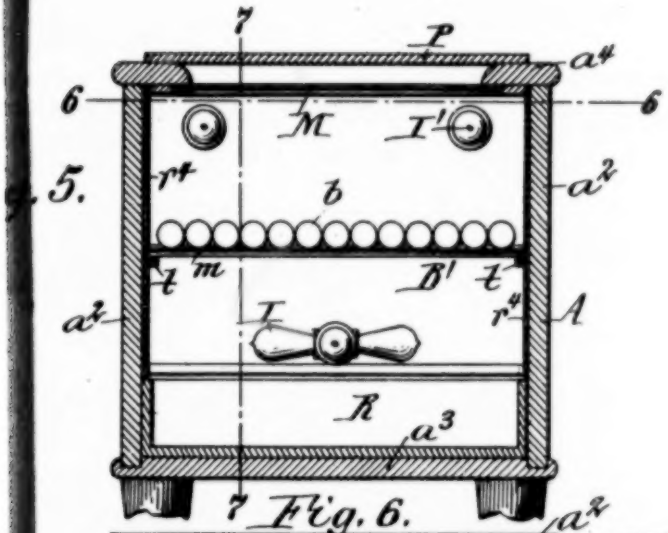


Fig. 6.

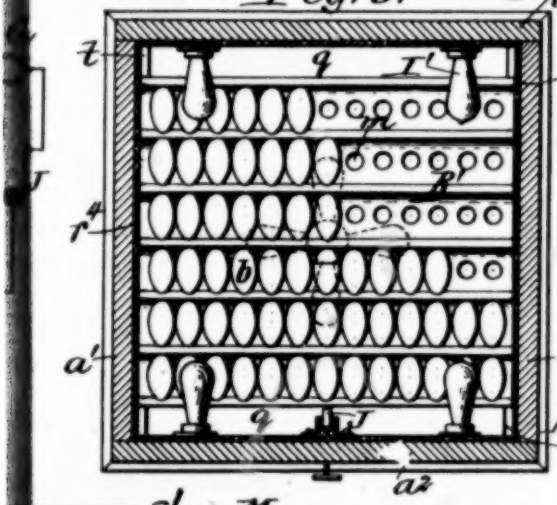
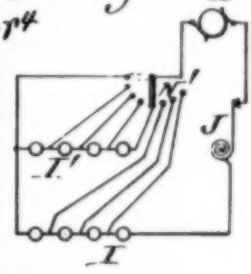


Fig. 9.



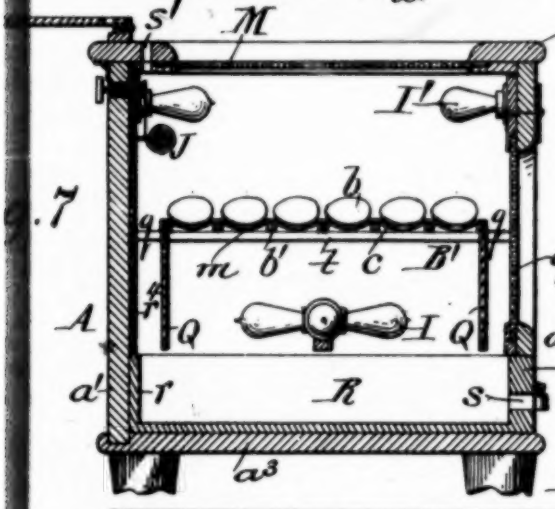


Fig. 11.

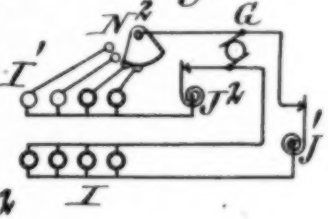
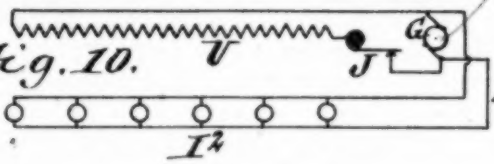


Fig. 10.



Frank C. Perkins,
Inventor

By Geyer & Popp
Attorneys

UNITED STATES PATENT OFFICE.

FRANK CLINTON PERKINS, OF BUFFALO, NEW YORK.

ELECTRICAL INCUBATOR.

SPECIFICATION forming part of Letters Patent No. 745,458, dated December 1, 1903.

Application filed July 30, 1903. Serial No. 167,574. (No model.)

To all whom it may concern:

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is provided, whereby the coils of the solenoid-magnets are alternately connected with and disconnected from an electric generator. This switch may be of any suitable construction; but I prefer for this purpose that shown in Fig. 4, which is constructed as follows: F represents a rotary switch blade or arm which may be turned, say, once every twenty-four hours by a motor of any suitable construction—for instance, a spring-motor, such as is commonly used in clocks. This switch-arm is connected by a wire *f* with one pole of an electric generator or dynamo G of any suitable construction. On diametrically opposite sides of this switch-arm are arranged two contacts *g g*, each of which is connected with one end of one of the solenoid-magnet coils. The opposite ends of both coils are connected by a wire *h*, which is indirectly connected with the opposite pole of the electric generator. By this means the switch-arm upon rotating engages the contacts *g g* alternately at intervals of twelve hours, whereby the magnets are rendered alternately operative for oscillating the tray and turning the eggs twice a day.

Within the incubating-chamber is arranged an electric heater, which raises the temperature within the incubator sufficiently high to hatch the eggs and keep the resulting chicks warm. Although various means may be employed for translating electrical energy into heat suitable for this purpose, I prefer a plurality of incandesent lamps I I', because the same can be utilized not only for heating the incubator, but also as an illuminator to provide the necessary illumination for testing the eggs, as will be hereinafter described. As shown in the drawings, a set or group of incandescent electric lamps I is arranged in the incubating-chamber below the egg-tray, and a similar group of incandescent lamps I' is arranged in the chamber above the egg-tray. These lamps are so arranged relatively to one another and the egg-tray to produce practically a uniform temperature in all parts of the incubator. As shown in Figs. 1, 2, and 3, the lamps I' of the upper group are arranged around the inner side of the incubating-chamber, while the lamps I of the lower group are preferably mounted on opposite sides of a longitudinal bar *i*, which is arranged centrally in the lower part of the chamber and secured at opposite ends to the adjacent end walls of the chamber. These lamps may either be plain white or suitably colored to modify the light, if desired. The electrical circuit containing these lamps includes a thermostat J, which is arranged within the incubator or in a space communicating therewith and operates to control the electric circuit of the lamps. Various kinds of thermostats may be utilized for this purpose; but I prefer that shown in the drawings, which consists, essentially, of a coil *j* of differential layers or strips of metal having its inner end secured to a fixed support, while its outer movable end carries an electric contact *j'*, which is engaged with and disengaged from a stationary contact j^2 of the circuit as the coil expands or contracts, due to the rise and fall of the temperature in the incubating-chamber. The stationary contact j^2 preferably consists of a screw which is accessible from the outside of the incubating-chamber and which upon being turned permits of varying the time of opening the lamp or heater circuit according to the degrees of temperature which it is desired to maintain in the incubator. In operation the thermostat closes the circuit and causes the lamps to be illuminated and generate heat, while if the temperature in the incubating-chamber rises above normal the thermostat opens the electric circuit and extinguishes the lamps, causing the temperature in the chamber to be reduced. After the temperature has again been reduced to normal the thermostat reëstablishes the electric circuit containing the lamps, whereby the latter are again lighted and generate heat.

It has been found in practice that the eggs require to be cooled off at intervals in order to produce proper incubation, and means have therefore been provided whereby this can be effected automatically. For this purpose the circuit of the heater-lamps is combined with the switch-arm F, and segmental contacts *k* k' k^2 are provided, with which said arm is adapted to engage. The lamp-contact *k* extends in the form of a semicircle from one magnet-contact *g* to the other, while the contacts k' k^2 are in the form of quadrants and extend toward each other from opposite sides of the magnet-contacts and are separated at their opposing ends by an insulating-section *l*. The several heater or lamp contacts *k* k' k^2 are electrically connected with each other and with one side of the lamps, and as the switch-arm F sweeps over the same the lamps are placed in circuit and illuminated. As the arm sweeps over the insulating-section the circuit of the lamps is broken and the latter are extinguished. The insulating-section is of such length that the lamps will remain extinguished a sufficient time to effect the required cooling of the eggs. As shown in Fig. 4, one or both groups of lamps may form part of the electric circuit of the magnets when the latter are operative.

In order to permit of testing the eggs while the same are in the incubator, means are provided whereby the light in the incubator below the eggs is caused to illuminate the same and permit inspection thereof. As shown in Figs. 1, 2, and 3, each of the egg-troughs is provided with a plurality of openings *m* in its lowermost part, over each of which except one an egg is located in the normal position of the tray. This causes the light from below the tray to shine upwardly through the eggs and permits of inspecting the quality of the eggs from above. By placing a glass pane M in the top of the chamber this inspection

can take place from the outside of the incubator, thereby avoiding the necessity of opening the incubator and cooling the eggs while inspecting the same. Furthermore, the eggs may thus be under continuous examination throughout the period of incubation, and poor eggs may be removed without handling those in good condition. For the purpose of intensifying the light below the eggs during inspection the upper group of lamps at this time is cut out and the circuit is concentrated upon the lower group of lamps, this being accomplished by means of a switch N. It is immaterial as to the particular manner in which the lamps are coupled with the electric generator and other parts of the apparatus for accomplishing this result. As shown in Fig. 4, each group of lamps is connected in parallel, and the corresponding ends of both groups are connected by a wire n with the movable contact j' of the thermostat, while the stationary contact j^2 of the latter is connected with the pole of the dynamo opposite to that with which the contact-arm F is connected. The opposite ends of the groups of lamps are provided with contacts $o\ o'$, either of which can be engaged by the switch N, which is connected with the sectional contacts $k\ k'\ k^2$. When the incubator is in operation and the switch N is engaged with the contact o' of the upper group of lamps, as shown in full lines in Fig. 4, the current from the dynamo passes through both groups in series, and the upper and lower parts of the incubating-chamber are both heated and illuminated, but not at full candle-power. When it is desired to test the eggs, the switch N is disengaged from the contact o' of the upper group of lamps and engaged with the contact o of the lower group of lamps, as shown by dotted lines in Fig. 4. In this position of the switch the current of the dynamo only passes through the lower set of lamps, the resistance of the upper lamps being cut out of circuit, thereby illuminating the lower lamps more brilliantly than when both sets of lamps are in use. This increased brilliancy of the lower lamps increases the illumination of the eggs from the bottom and permits of more easily detecting any defective eggs in the tray. After inspection the switch is restored to its position for placing the upper set of lamps again in circuit for resuming the normal operation of the incubator. The illumination of the eggs for testing the same may be further increased by reflecting the light in the lower part of the incubating-chamber upwardly. This can be done by applying white paint to the interior of the incubating-chamber below the tray between the partitions Q or by placing reflectors i' underneath the lamps, as shown in Figs. 1 and 3. The interior of the chamber above the tray and the sides of the passages q are preferably painted black to prevent reflection of light above the eggs.

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support, while its outer movable end carries an electric contact *j'*, which is engaged with and disengaged from a stationary contact j^2 of the circuit as the coil expands or contracts, due to the rise and fall of the temperature in the incubating-chamber. The stationary contact j^2 preferably consists of a screw which is accessible from the outside of the incubating-chamber and which upon being turned permits of varying the time of opening the lamp or heater circuit according to the degrees of temperature which it is desired to maintain in the incubator. In operation the thermostat closes the circuit and causes the lamps to be illuminated and generate heat, while if the temperature in the incubating-chamber rises above normal the thermostat opens the electric circuit and extinguishes the lamps, causing the temperature in the chamber to be reduced. After the temperature has again been reduced to normal the thermostat reëstablishes the electric circuit containing the lamps, whereby the latter are again lighted and generate heat.

It has been found in practice that the eggs require to be cooled off at intervals in order to produce proper incubation, and means have therefore been provided whereby this can be effected automatically. For this purpose the circuit of the heater-lamps is combined with the switch-arm F, and segmental contacts *k* k' k^2 are provided, with which said arm is adapted to engage. The lamp-contact *k* extends in the form of a semicircle from one magnet-contact *g* to the other, while the contacts k' k^2 are in the form of quadrants and extend toward each other from opposite sides of the magnet-contacts and are separated at their opposing ends by an insulating-section *l*. The several heater or lamp contacts *k* k' k^2 are electrically connected with each other and with one side of the lamps, and as the switch-arm F sweeps over the same the lamps are placed in circuit and illuminated. As the arm sweeps over the insulating-section the circuit of the lamps is broken and the latter are extinguished. The insulating-section is of such length that the lamps will remain extinguished a sufficient time to effect the required cooling of the eggs. As shown in Fig. 4, one or both groups of lamps may form part of the electric circuit of the magnets when the latter are operative.

In order to permit of testing the eggs while the same are in the incubator, means are provided whereby the light in the incubator below the eggs is caused to illuminate the same and permit inspection thereof. As shown in Figs. 1, 2, and 3, each of the egg-troughs is provided with a plurality of openings *m* in its lowermost part, over each of which except one an egg is located in the normal position of the tray. This causes the light from below the tray to shine upwardly through the eggs and permits of inspecting the quality of the eggs from above. By placing a glass pane M in the top of the chamber this inspection

can take place from the outside of the incubator, thereby avoiding the necessity of opening the incubator and cooling the eggs while inspecting the same. Furthermore, the eggs may thus be under continuous examination throughout the period of incubation, and poor eggs may be removed without handling those in good condition. For the purpose of intensifying the light below the eggs during inspection the upper group of lamps at this time is cut out and the circuit is concentrated upon the lower group of lamps, this being accomplished by means of a switch N. It is immaterial as to the particular manner in which the lamps are coupled with the electric generator and other parts of the apparatus for accomplishing this result. As shown in Fig. 4, each group of lamps is connected in parallel, and the corresponding ends of both groups are connected by a wire n with the movable contact j' of the thermostat, while the stationary contact j^2 of the latter is connected with the pole of the dynamo opposite to that with which the contact-arm F is connected. The opposite ends of the groups of lamps are provided with contacts o o', either of which can be engaged by the switch N, which is connected with the sectional contacts k k' k^2. When the incubator is in operation and the switch N is engaged with the contact o' of the upper group of lamps, as shown in full lines in Fig. 4, the current from the dynamo passes through both groups in series, and the upper and lower parts of the incubating-chamber are both heated and illuminated, but not at full candle-power. When it is desired to test the eggs, the switch N is disengaged from the contact o' of the upper group of lamps and engaged with the contact o of the lower group of lamps, as shown by dotted lines in Fig. 4. In this position of the switch the current of the dynamo only passes through the lower set of lamps, the resistance of the upper lamps being cut out of circuit, thereby illuminating the lower lamps more brilliantly than when both sets of lamps are in use. This increased brilliancy of the lower lamps increases the illumination of the eggs from the bottom and permits of more easily detecting any defective eggs in the tray. After inspection the switch is restored to its position for placing the upper set of lamps again in circuit for resuming the normal operation of the incubator. The illumination of the eggs for testing the same may be further increased by reflecting the light in the lower part of the incubating-chamber upwardly. This can be done by applying white paint to the interior of the incubating-chamber below the tray between the partitions Q or by placing reflectors i' underneath the lamps, as shown in Figs. 1 and 3. The interior of the chamber above the tray and the sides of the passages q are preferably painted black to prevent reflection of light above the eggs.

In order to prevent the glass in the top of the incubating-chamber from being broken and to confine the heat, a cover P is provided, which is placed over the glass after inspection. This cover is preferably hinged on one side to the top of the incubating-chamber, and the top in turn is hinged to one side of the chamber to afford access to the latter from above for placing eggs upon the tray or removing the same therefrom.

After the chicks are hatched out of the eggs they are housed in the lower part of the incubator, which latter serves as a brooder until the chicks are sufficiently advanced to permit of removing the same from the incubator. In order to enable the chicks to thus pass from the tray into the lower part of the incubator-chamber, the tray is separated from the adjacent walls of the incubator at one or both sides by an intervening space q, through which the chicks drop from the tray into the space below the same. To prevent the light of the lower set of lamps from passing upwardly through the spaces q and interfering with testing of the eggs, upright shutters or partitions Q are arranged lengthwise in the chamber on opposite sides of the egg-tray. These partitions extend upwardly far enough to engage the egg-tray in all positions of the latter and downwardly far enough to exclude the light-rays of the lower lamps from the passages q, as shown in Fig. 3. The egg-tray is preferably removably pivoted on the partitions Q by engaging or journaling the ends of the pivot-rod c^2 in bearing seats or notches q' in the upper edges of the partitions. One of the walls of the incubating-chamber is preferably movable to permit the tray to be removed from the chamber for cleaning or filling the same. As shown in Fig. 3, the front wall or panel a is hinged at its upper end to the chamber to permit of passing the tray into and out of the chamber, and this panel is also provided with a glass pane q^2 to permit of observing the condition of the chicks from the exterior. As the chicks drop through the passages q they enter a drawer R, arranged in the lower part of the incubating-chamber. This drawer is removable through an opening in the side of the chamber and is preferably constructed so that the same may be utilized as a brooder. For this purpose the inner and outer walls r r' of the drawer are hinged at their lower ends, and a flexible curtain r^2 is arranged across the central part of the drawer parallel with the wall of the chamber containing the opening through which the drawer passes. This curtain is supported at its upper end by a cross-bar r^3, which is mounted on the fixed end walls of the drawer. During the period of incubation the drawer is pushed into the chamber its fullest extent and the inner and outer walls thereof are turned upwardly into a vertical position, whereby the inner wall of the drawer lies against the rear side of the chamber and the front wall thereof is in line with the front side of the chamber, as shown in full lines, Fig. 3. In this position of the

drawer the chicks drop into the same from the tray. When all of the chicks have been hatched and delivered into the drawer, the latter is drawn outwardly until the curtain is in line with the front side of the chamber, after which the inner wall is turned downwardly into a horizontal position and the front wall is turned downwardly into an inclined position, as shown by dotted lines in Fig. 3. In this position of the parts the chicks can pass freely through the curtain into and out of the incubating-chamber and also down upon a feeding-ground, if desired, by connecting an inclined board or runway with the inclined front wall of the drawer. By keeping the front wall of the drawer raised after the same is withdrawn the chicks are confined within the drawer.

In order to prevent undue radiation of heat from the incubator, the side walls thereof other than the glass panels are covered with asbestos or other non-conducting covering r^4, or the walls may be made double to form an insulating air-space between the same in a well-known manner. Suitable air inlet and outlet openings *s s'* are also provided in the lower and upper parts of the incubating-chamber for maintaining the proper ventilation of the same.

If desired, the egg-tray may be rigidly supported within the incubating-chamber, which construction, however, necessitates turning the eggs manually. Such a construction is shown in Fig. 5, in which the tray B' is represented as mounted on horizontal cleats *t* on the inner sides of the chamber. When it is desired to turn the eggs, the tray is slid outwardly upon the cleats and through an opening in the side of the chamber, which opening is normally closed by the adjacent hinged wall of the chamber.

Instead of hinging the front and rear walls of the drawer the same may be fixed as shown in Fig. 7.

When no means are employed for automatically turning the eggs, the wiring of the electric circuits may be simplified, as shown in Fig. 8. In this construction the thermostat is interposed between one pole of the generator and one side of one set of lamps, and the switch is arranged to connect the opposite pole of the generator with the opposite side of either one or both sets of lamps. This figure also shows each group of lamps arranged in multiple and the two groups connected in series. In Fig. 9 the lamps of both groups are connected in series and the switch N' is so constructed that any number of the lamps may be cut out.

Instead of employing electric lamps as the means of heating the interior of the incubating-chamber, the same effect may be produced by using any other well-known means for developing heat electrically. For instance, as shown in Fig. 10, a group of lamps I^3 is employed in the lower part of the incubating-chamber, while a resistance-coil U or other electric heater is employed in the upper part of the incubating-chamber.

If desired, the thermostat may be arranged to open and close an electric circuit which includes only part of the heating device, while the other part of the heating device may be arranged in an electric circuit which is constantly closed. Such an organization is shown in Fig. 10, in which the resistance-coil is controlled by the thermostat and the lamps are constantly in circuit.

In Fig. 11 is shown an arrangement of wiring in which the circuits of the upper and lower sets of lamps I I' are separate, and these circuits contain separate thermostats J' J^2, whereby each set of lamps is controlled independent of the other set. This figure also shows a switch N^2 for cutting in or out more or less of the lamps which are connected in multiple in the upper set.

It will be observed that in the several constructions described the heating or illuminating devices and the thermostat for regulating the heat are all contained within the incubating-chamber. This permits of a more compact and sightly construction and enables the incubator to be shipped more easily than one in which the heating devices are arranged partly outside of the incubating-chamber. Furthermore, by arranging the electric heater directly in the incubating-chamber and opening or closing its circuit by a thermostat also arranged within the chamber no heat is wasted, as is the case in heaters containing dampers or valves, whereby the heat is diverted from the incubating-chamber into the atmosphere when the chamber is too warm.

I claim as my invention—

1. The combination of an incubating-chamber, a tray for supporting eggs comprising a plurality of parallel troughs each of which is provided in its bottom with a row of openings over which eggs are adapted to be placed, and electric lamps arranged in said chamber below said tray, substantially as set forth.

2. The combination of an incubating-chamber, a tray for supporting eggs comprising a plurality of parallel troughs each of which is provided in its bottom with a row of openings over which eggs are adapted to be placed, electric lamps arranged in said chamber below the tray, and a thermostat also arranged in said chamber and controlling the circuit of said lamps, substantially as set forth.

3. The combination of an incubating-chamber, a tray for supporting eggs arranged in the chamber, electric lamps arranged in said chamber above and below said tray, and a switch for controlling the circuit of the lamps above the tray, substantially as set forth.

4. The combination of an incubating-chamber, an egg-tray arranged in said chamber and provided with openings over which the eggs are adapted to be placed, electric lamps arranged in the chamber above and below said

tray, and a switch controlling the circuit of the lamps above the tray, substantially as set forth.

5. The combination of an incubating-chamber, an egg-tray arranged in said chamber and provided with openings over which the eggs are adapted to be placed, electric lamps arranged in the chamber above and below said tray, a thermostat arranged in said chamber and controlling the circuit of said lamps, and a manual switch controlling the circuit of the lamps, substantially as set forth.

6. The combination of an incubating-chamber provided in its top with a transparent pane, a horizontal egg-tray arranged in the chamber and provided with a plurality of openings over which eggs are adapted to be placed, electric lamps arranged in said chamber below said tray, and a switch for controlling said lamps, substantially as set forth.

7. The combination of an incubating-chamber, an egg-tray arranged in the chamber, electric lamps mounted on the walls of the chamber above the tray, a supporting-bar arranged centrally in the chamber below the tray, and electric lamps mounted on said bar, substantially as set forth.

8. The combination of an incubating-chamber, an egg-tray arranged in the chamber, electric lamps mounted on the walls of the chamber above the tray, a supporting-bar arranged centrally in the chamber below the tray and secured at its ends to the walls of the chamber, and electric lamps mounted on opposite sides of said bar, substantially as set forth.

9. The combination of an incubating-chamber, an egg-tray arranged in said chamber, an electric lamp arranged below the tray, and a reflector arranged below said lamp, substantially as set forth.

10. The combination of an incubating-chamber, an egg-tray arranged in said chamber provided with openings over which the eggs are placed, a bar arranged below the tray, electric lamps mounted on said bar, and a reflector arranged below the lamps and also mounted on said bar, substantially as set forth.

11. The combination of an incubating-chamber, an egg-tray arranged in said chamber and separated at its side from the wall of the chamber by an intervening passage, lamps arranged below the tray, and a partition or shutter extending downwardly from the side of the tray, substantially as set forth.

12. The combination of an incubating-chamber, an egg-tray arranged in said chamber and separated at opposite sides from the walls of the chamber, lamps arranged below the tray, and partitions extending from opposite sides of the tray downwardly below the lamps, substantially as set forth.

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If desired, the thermostat may be arranged to open and close an electric circuit which includes only part of the heating device, while the other part of the heating device may be arranged in an electric circuit which is constantly closed. Such an organization is shown in Fig. 10, in which the resistance-coil is controlled by the thermostat and the lamps are constantly in circuit.

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It will be observed that in the several constructions described the heating or illuminating devices and the thermostat for regulating the heat are all contained within the incubating-chamber. This permits of a more compact and sightly construction and enables the incubator to be shipped more easily than one in which the heating devices are arranged partly outside of the incubating-chamber. Furthermore, by arranging the electric heater directly in the incubating-chamber and opening or closing its circuit by a thermostat also arranged within the chamber no heat is wasted, as is the case in heaters containing dampers or valves, whereby the heat is diverted from the incubating-chamber into the atmosphere when the chamber is too warm.

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1. The combination of an incubating-chamber, a tray for supporting eggs comprising a plurality of parallel troughs each of which is provided in its bottom with a row of openings over which eggs are adapted to be placed, and electric lamps arranged in said chamber below said tray, substantially as set forth.

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3. The combination of an incubating-chamber, a tray for supporting eggs arranged in the chamber, electric lamps arranged in said chamber above and below said tray, and a switch for controlling the circuit of the lamps above the tray, substantially as set forth.

4. The combination of an incubating-chamber, an egg-tray arranged in said chamber and provided with openings over which the eggs are adapted to be placed, electric lamps arranged in the chamber above and below said

tray, and a switch controlling the circuit of the lamps above the tray, substantially as set forth.

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6. The combination of an incubating-chamber provided in its top with a transparent pane, a horizontal egg-tray arranged in the chamber and provided with a plurality of openings over which eggs are adapted to be placed, electric lamps arranged in said chamber below said tray, and a switch for controlling said lamps, substantially as set forth.

7. The combination of an incubating-chamber, an egg-tray arranged in the chamber, electric lamps mounted on the walls of the chamber above the tray, a supporting-bar arranged centrally in the chamber below the tray, and electric lamps mounted on said bar, substantially as set forth.

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13. The combination of an incubating-chamber, an oscillating egg-tray arranged in said chamber and separated on opposite sides by intervening spaces from the adjacent walls of the chamber, upright partitions which are arranged in the chamber adjacent to the sides of the tray and upon the upper ends of which the tray is journaled, and lamps arranged in the chamber below the tray, substantially as set forth.

14. The combination of an incubating-chamber, an oscillating egg-tray arranged in said chamber, and an electromagnetic shifting device for operating said tray, substantially as set forth.

15. The combination of an incubating-chamber, an oscillating egg-tray pivoted centrally in said chamber, and means for shifting said tray consisting of electromagnets having their armatures connected with opposite ends of the tray, substantially as set forth.

16. The combination of an incubating-chamber, an oscillating egg-tray pivoted centrally in said chamber, and means for shifting said tray consisting of electromagnets having their armatures connected with opposite ends of the tray and a switch for directing an electric current alternately through the coils of said magnets, substantially as set forth.

17. The combination of an incubating-chamber provided in its top with a transparent pane, an egg-tray arranged in the chamber and provided with a plurality of openings over which eggs are adapted to be placed, electric lamps arranged in said chamber below said tray, and a drawer for receiving the chicks arranged in the chamber below the tray, substantially as set forth.

18. The combination of an incubating-chamber, an egg-tray arranged in said chamber, a drawer arranged below the tray and adapted to be withdrawn through an opening in the wall of the chamber, and a curtain arranged in the drawer parallel to said wall containing said opening, substantially as set forth.

19. The combination of an incubating-chamber provided with an opening in the lower part of one of its walls, an egg-tray arranged in said chamber above said opening, a drawer movable through said opening and provided with a hinged front wall which is adapted to close said opening, and a curtain arranged in the drawer parallel with the wall containing said opening, substantially as set forth.

20. The combination of an incubating-chamber provided with an opening in the lower part of one of its walls, an egg-tray arranged in said chamber above said opening, a drawer movable through said opening and provided with movable front and rear walls, and a curtain arranged in said drawer parallel with the wall containing said opening, substantially as set forth.

21. The combination of an incubating-chamber, an egg-tray arranged in said chamber, an electric heater for said chamber, and

automatic means for periodically breaking the circuit of said heater, substantially as set forth.

22. The combination of an incubating-chamber, an egg-tray arranged in said chamber, an electric heater for said chamber, a thermostat arranged in said chamber and controlling the circuit of said heater, and automatic means for periodically breaking the circuit of said heater, substantially as set forth.

23. The combination of an incubating-chamber, an oscillating egg-tray arranged in said chamber, electromagnets for shifting said tray having their armatures connected with opposite ends of the tray, an electric heater arranged in said chamber, an electric generator having one pole connected with one side of the heater and the coils of said magnets, contacts connected with the opposite side of the heater and the magnet-coils, and a movable switch member connected with the other pole of the generator and adapted to engage successively with said magnet and heater contacts, substantially as set forth.

24. The combination of an incubating-chamber, an oscillating egg-tray arranged in said chamber, electromagnets for shifting said tray having their armatures connected with opposite ends of the tray, an electric heater arranged in said chamber and connected on one side with one end of said magnet-coils, a thermostat arranged in said chamber and interposed between one pole of an electric generator and said heater, a rotary contact-arm connected with the other pole of said generator, a pair of magnet-contacts arranged on opposite sides of said contact-arm and connected respectively with the opposite ends of said magnet-coils, segmental contacts arranged around said magnet-contacts and alternating with the same and connected with that side of the heater opposite the thermostat, and an insulating-section arranged between two adjacent contacts, said contact-arm being adapted to successively engage said contacts and insulating-section during its rotary movement, substantially as set forth.

Witness my hand this 25th day of July, 1903.

FRANK CLINTON PERKINS.

Witnesses:
THEO. L. POPP,
EMMA M. GRAHAM.

824 (Defendants' Exhibit P, Letters Patent
G. H. Boyd, August 7, 1906.)

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824 (Defendants' Exhibit P, Letters Patent No. 828,181 to G. H. Boyd, August 7, 1906.)

678 No. 828,181. PATENTED AUG. 7, 1906.

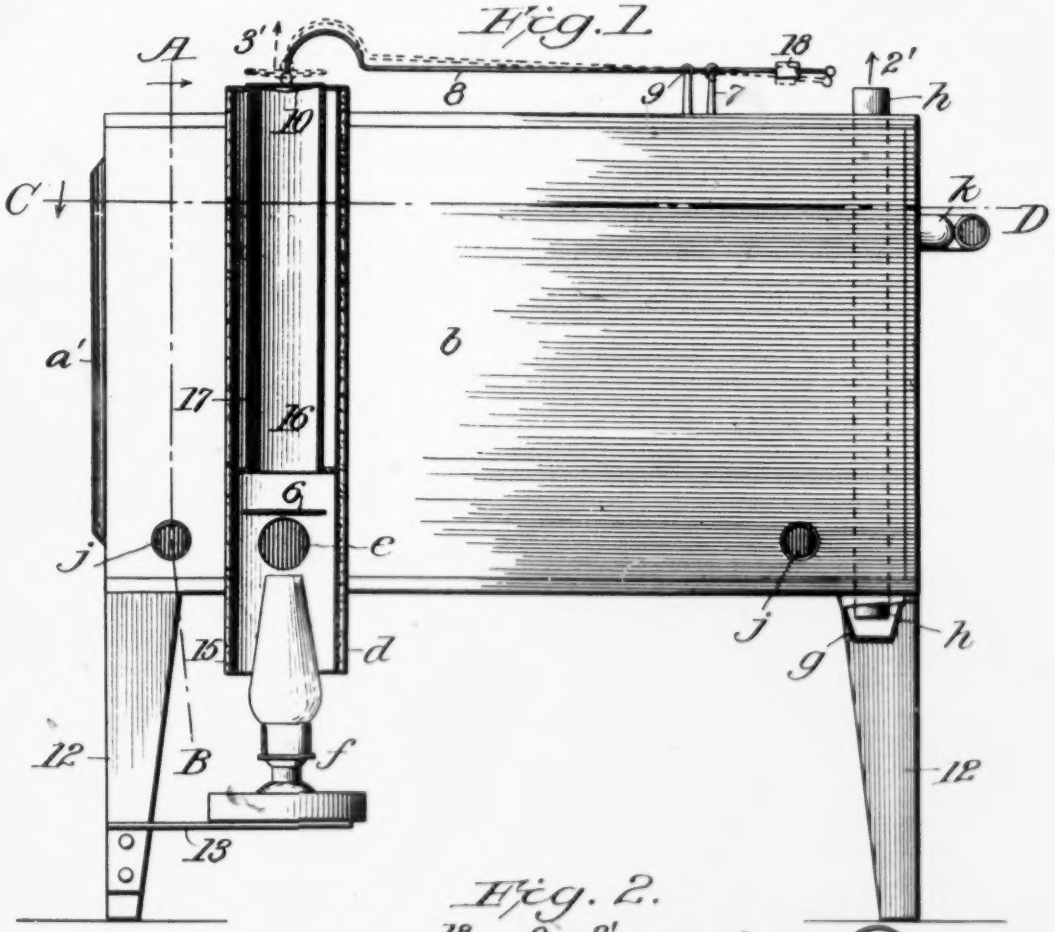
G. H. BOYD.

INCUBATOR.

APPLICATION FILED OCT. 31, 1905.

2 SHEETS—SHEET 1.

Fig. 1.



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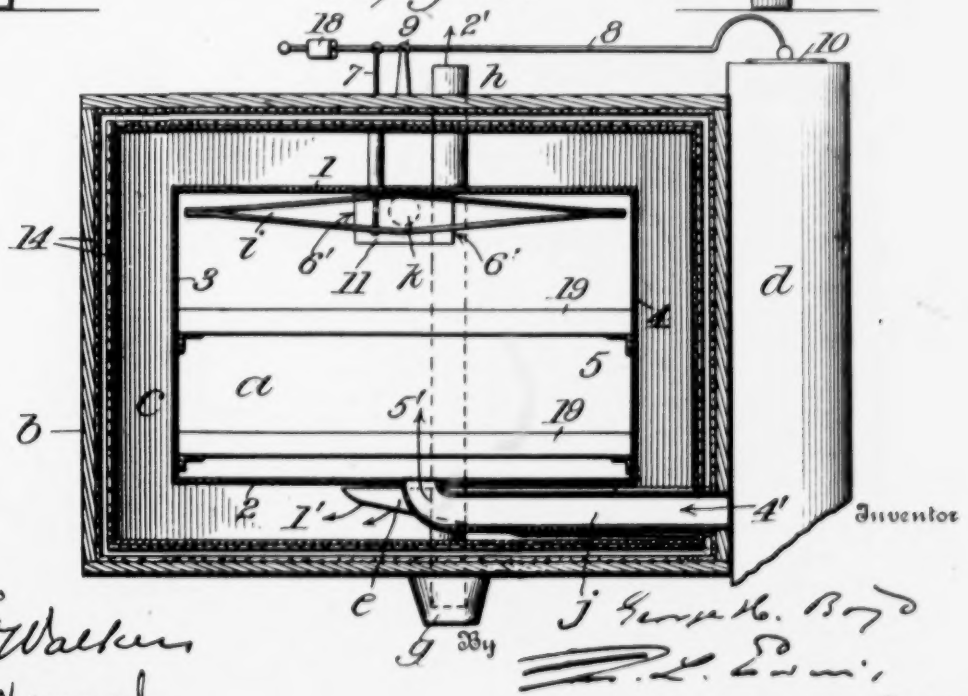

Witnesses

C. H. Walker

A. M. E. Kennedy

Inventor

By

Attorney

680 No. 828,181. PATENTED AUG. 7, 1906.

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APPLICATION FILED OCT. 31, 1905.

2 SHEETS—SHEET 2.

Fig. 3.

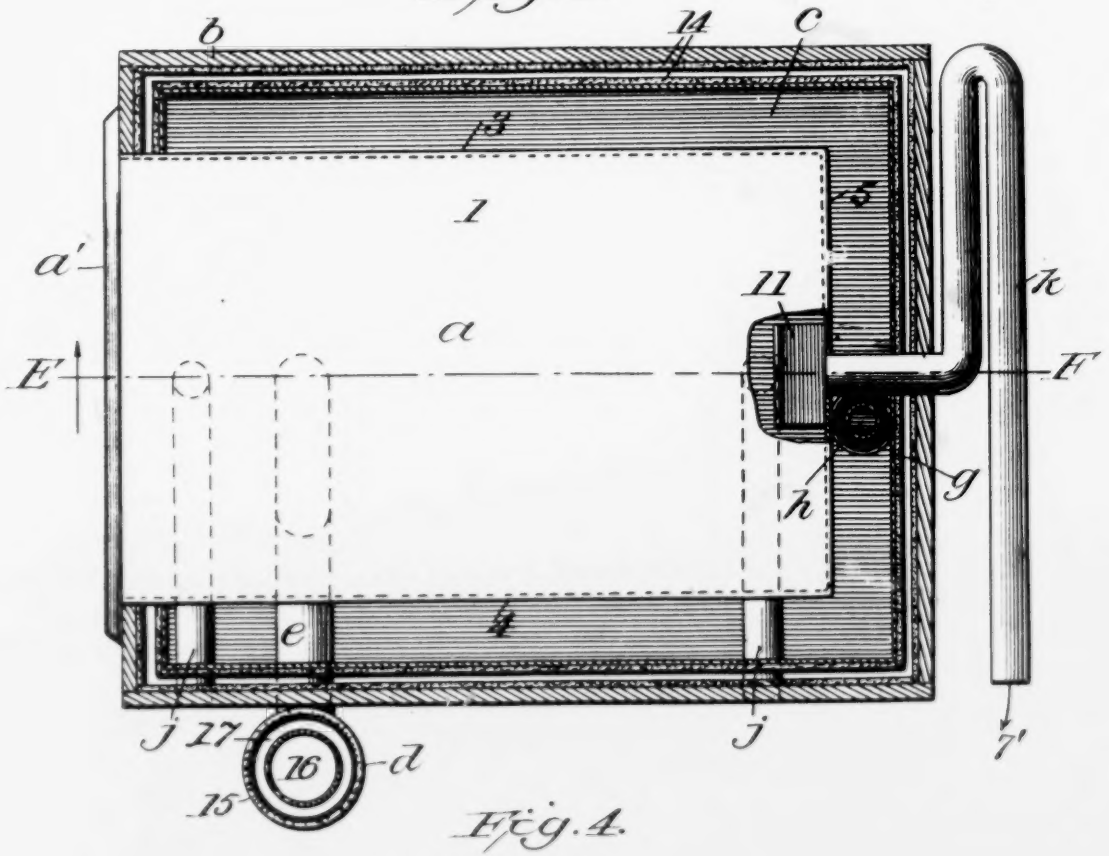
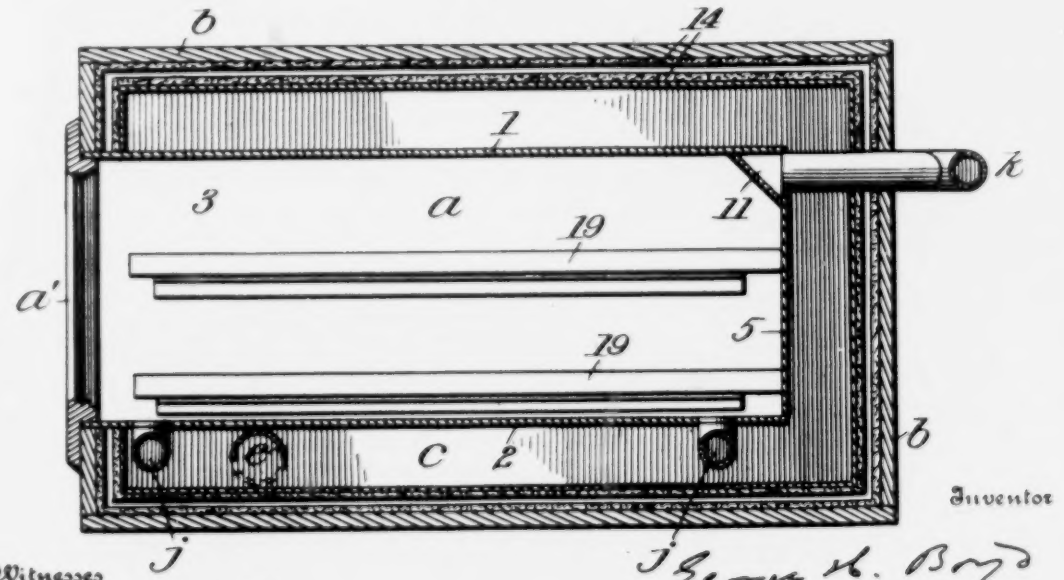


Fig. 4.



Witnesses

C. M. Walker.

A. M. E. Kennedy.

Inventor

Geo. H. Boyd

By

Attorney

UNITED STATES PATENT

GEORGE H. BOYD, OF WASHINGTON, DISTRICT

INCUBATOR.

No. 828,181. Specification of Letters Patent.

Application filed October 31, 1905. Serial No. 285,296.

To all whom it may concern:

Be it known that I, GEORGE H. BOYD, a citizen of the United States of America, and a resident of the city of Washington, in the District of Columbia, have invented a new and useful Improvement in Incubators, of which the following is a specification.

This invention relates, preferably, to lamp-heated incubators; and it consists in certain novel combinations of parts hereinafter set forth and claimed.

The leading object of the present invention is to freely discharge the foul air charged with carbon dioxid from the egg-chamber in such a way as to reduce to any desired extent the draft through the egg-chamber and at the same time to utilize the tendency of the heated air to escape at the top of the chamber and also to provide for keeping the egg-chamber supplied with heated fresh air.

Another object of the invention is to wholly dispense with regulating-slides and the like, so that there shall be at all times an abundant uniform supply of fresh air within the egg-chamber and a free escape of foul air therefrom.

Another object is to equalize the distribution of heat within the incubator, so that the temperature of the egg-chamber shall be uniform throughout.

Another object of the invention is to simplify the construction of the incubator to the utmost and at the same time to adapt the same for use in any convenient room.

Figure 1 represents a side view, partly in section. Fig. 2 represents a substantially vertical section on the line A B, Fig. 1. Fig. 3 represents a horizontal section on the line C D, Fig. 1; and Fig. 4 represents a vertical section on the line E F, Fig. 3.

Like reference characters indicate like parts in all the figures.

In the improved incubator a rectangular egg-chamber *a* is provided with a double glass door *a'* at one side, and its other five sides 1, 2, 3, 4, and 5 are of sheet metal and surrounded by an outer casing *b* and by a hot-air space *c* between the egg-chamber and said casing.

A vertical open-ended flue *d* is located outside of the casing *b* and connected with the air-space *c* by a horizontal tube *e*, opening into said flue at a point above its lower end and beneath a baffle-plate 6, as shown in Fig. 1, and into the bottom of said space beneath the egg-chamber, as shown in Figs. 2 and 4. Beneath said flue *d* ported, as represen from said lamp ent represented by arr rally rises within sa freely around the air within the spa into a well *g* at the escaping therefrom end of a vertical above the top of th ed by the arrows 2'. of the lower part o as its upper part, is provision is made the egg-chamber which it has hereto complish.

A thermostat *i*, this invention may proved constructio egg-chamber *a* at link 7 with a substa having a fulcrum 9 bator and pivotally to a damper 10, b *d* is normally closed lines in Fig. 1. W egg-chamber *a* bec excessive, the therm nections opens said ed in dotted lines in the lamp *f* is permit ward, as represente 1, so as not to enter to more quickly re the egg-chamber to admission of heat to to continue, and the is regulated.

Fresh air is admit at bottom through tubes *j*, of thin meta extending through shown in Figs. 1, 2, a ing upward throug chamber, as shown i arrows 4' and 5'.) maintained at the te space *c*, and the fresh *a* is heated to a suf therethrough, so as t the eggs by the admi

The foul air escap egg-chamber *a*, as re 6' and 7' in Figs. 2 a

PATENTED AUG. 7, 1906.

G. H. BOYD.

INCUBATOR.

APPLICATION FILED OCT. 31, 1905.

2 SHEETS—SHEET 2.

Fig. 3.

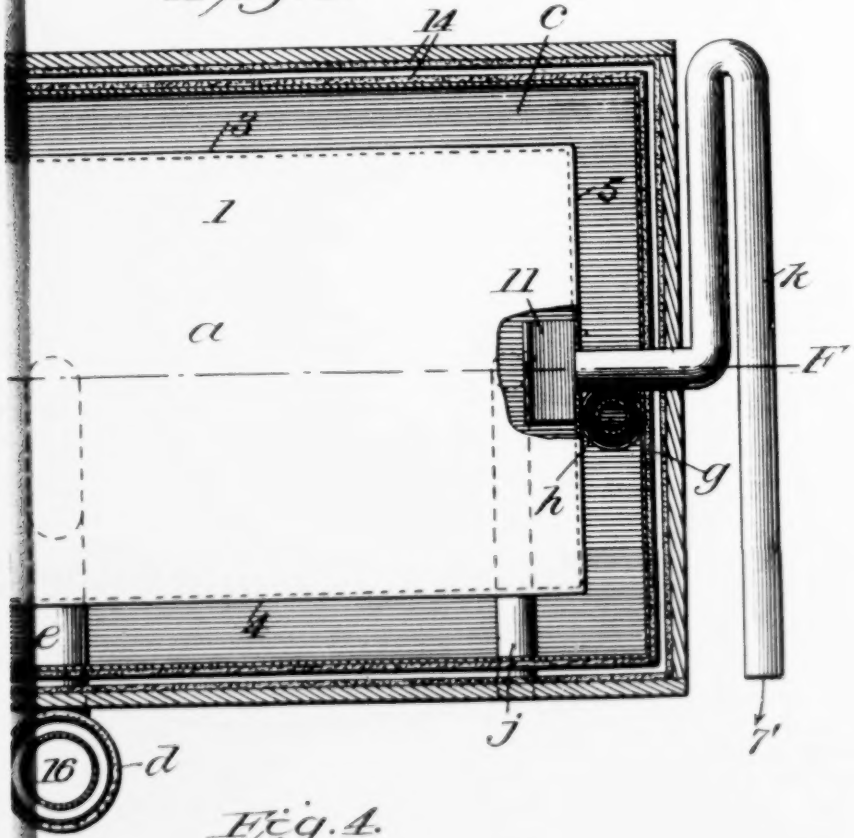
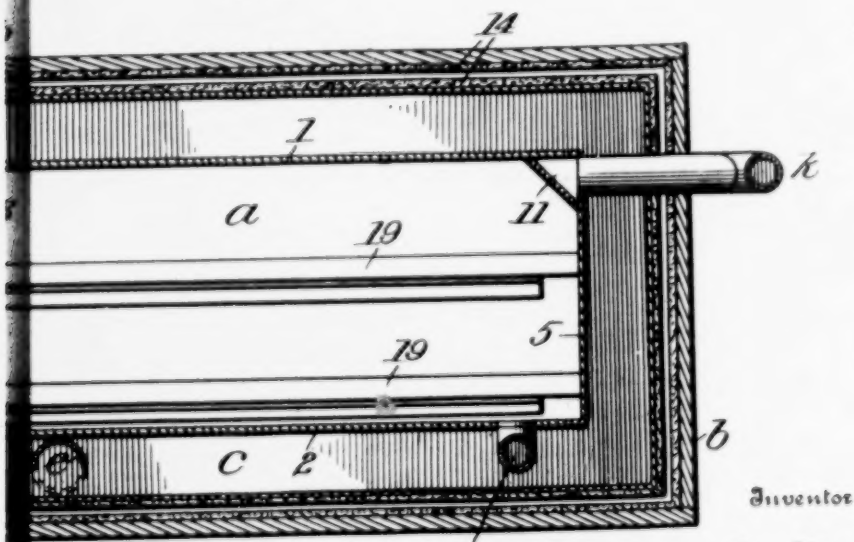


Fig. 4.



Inventor

George H. Boyd

By

Attorney

UNITED STATES PATENT OFFICE

GEORGE H. BOYD, OF WASHINGTON, DISTRICT OF COLUMBIA.

INCUBATOR.

No. 828,181. Specification of Letters Patent. Patented Aug. 7, 1906.

Application filed October 31, 1905. Serial No. 285,296.

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A vertical open-ended flue *d* is located outside of the casing *b* and connected with the air-space *c* by a horizontal tube *e*, opening into said flue at a point above its lower end and beneath a baffle-plate 6, as shown in Fig. 1, and into the bottom of said space beneath the egg-chamber, as shown in Figs. 2 and 4. Beneath said flue *d* a suitable lamp *f* is supported, as represented in Fig. 1, and the heat from said lamp enters said hot-air space *c*, as represented by arrows 1' in Fig. 2. It naturally rises within said air-space and circulates freely around the egg-chamber, the cooler air within the space descending by gravity into a well *g* at the bottom of the casing and escaping therefrom through the open lower end of a vertical pipe *h*, which discharges above the top of the incubator, as represented by the arrows 2'. In this way the heating of the lower part of the egg-chamber, as well as its upper part, is insured, or, in other words provision is made for rendering the heat of the egg-chamber uniform at all heights, which it has heretofore been difficult to accomplish.

A thermostat *i*, which for the purposes of this invention may be of any known or improved construction, is located within the egg-chamber *a* at top and connected by a link 7 with a substantially horizontal lever 8, having a fulcrum 9 upon the top of the incubator and pivotally attached at its long end to a damper 10, by which the top of the flue *d* is normally closed, as in Fig. 2 and in full lines in Fig. 1. When the heat within the egg-chamber *a* becomes to the least degree excessive, the thermostat *i* through said connections opens said damper 10, as represented in dotted lines in Fig. 1, and the heat from the lamp *f* is permitted to escape directly upward, as represented by the arrow 3' in Fig. 1, so as not to enter the air-space *c*, and thus to more quickly reduce the temperature of the egg-chamber to normal than when the admission of heat to the air-space is permitted to continue, and the escape of air therefrom is regulated.

Fresh air is admitted to the egg-chamber *a* at bottom through substantially horizontal tubes *j*, of thin metal, having open inlet ends extending through the outer casing *b*, as shown in Figs. 1, 2, and 3, and inner ends opening upward through the floor of the egg-chamber, as shown in Figs. 2 and 4. (See the arrows 4' and 5'.) Such air-inlet tubes are maintained at the temperature of the hot-air space *c*, and the fresh air for the egg-chamber *a* is heated to a sufficient extent in passing therethrough, so as to prevent any chilling of the eggs by the admission of fresh air.

The foul air escapes from the top of the egg-chamber *a*, as represented by the arrows 6' and 7' in Figs. 2 and 3, preferably at its in-

682

ner or rear end, through a thin metal tube *k*, which may be of suitable sheet metal and open-ended and is extended in a substantially horizontal plane outside the outer casing *b* and remote from the heat-flue *d*, as shown in Figs. 1, 3, and 4, so as to be maintained at the temperature of the room in which the incubator is located, and thus adapted to reduce the escaping foul air to substantially the same temperature as the air of such room in its passage therethrough and to prevent excessive draft within the egg-chamber. The foul air carries off with it the carbon dioxid thrown off by the eggs, and the atmosphere of the egg-chamber *a* is thus kept pure. A baffle-plate 11, forming an open-ended space at the inner end of the foul-air tube *k*, assists to prevent a direct draft toward said inner end, and thus insures a more perfect circulation of air within the egg-chamber *a*. The air-inlet tube *j* and the foul-air tube *k* are preferably of one and the same diameter, and the employment of a plurality of the former thus insures an abundant supply of oxygen within the egg-chamber and also provides for the admission of the air at the respective ends of the egg-trays or their equivalent and its uniform distribution throughout the egg-chamber.

The body of the incubator may be supported at a convenient height by legs 12 or their equivalent, which may in turn be provided with any suitable lamp-support 13. The outer casing *b* is preferably made with hollow walls, externally of wood and internally of sheet metal, and with asbestos linings 14 within the air-spaces. The external heat-flue *d* is also preferably provided with an asbestos jacket 15 to economize the heat, and its upper part is preferably contracted by an inner tube 16, surrounded by an air-space 17, the latter being closed at top and bottom, while said inner tube 16 is open-ended and forms the upward extension of the interior of the flue.

The operation of the thermostat *i* and its connections is or may be regulated by a sliding weight 18 or in any known or improved manner. Otherwise no regulation of the incubator is required, and it is adapted to take care of itself within any ordinary room.

The egg-supports 19 within the egg-chamber *a* may be of any known or improved construction, and other like modifications will suggest themselves to those skilled in the art.

Having thus described said improvement, I claim as my invention and desire to patent under this specification—

1. The combination, in an incubator, of an egg-chamber, means for heating the same, means for admitting fresh air to said chamber, and means for the escape of foul air therefrom, the foul-air escape consisting of an open-ended and unobstructed tube of thin metal in direct communication with the upper part of the egg-chamber extended outside of the incubator and exposed to the air within the room in which the incubator is located, whereby the foul air is permitted to escape freely and is reduced in temperature before its escape from said tube.

2. The combination, in an incubator, of an egg-chamber, means for heating the same, means for admitting fresh air to said egg-chamber at bottom, and means for the escape of the foul air charged with carbon dioxid from the upper part of the egg-chamber, the foul-air outlet consisting of an open-ended and unobstructed tube of thin metal in direct communication with the upper part of the egg-chamber at the inner end and extended outside the incubator in a substantially horizontal direction to a sufficient extent to reduce the temperature of the escaping foul air before its escape from said tube and thus to prevent excessive draft within the egg-chamber.

3. The combination, in an incubator, of a non-conducting outer casing, egg-chamber walls of sheet metal within said outer casing, a hot-air space being formed between said sheet-metal walls and said outer casing, a suitable egg-chamber door, a vertical heat-flue external to said outer casing, a horizontal tube connecting said heat-flue with said hot-air space, a well in the outer casing, and an outlet-pipe extending upwardly from within said well through the top of the incubator, substantially as hereinbefore specified.

GEO. H. BOYD.

Witnesses:
JAS. L. EWIN,
A. M. SPOFFORD.

830 (Defendants' Exhibit P, Letters Patent No. L. Verna, June 16, 1908.)

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2. The combination, in an incubator, of an egg-chamber, means for heating the same, means for admitting fresh air to said egg-chamber at bottom, and means for the escape of the foul air charged with carbon dioxid from the upper part of the egg-chamber, the foul-air outlet consisting of an open-ended and unobstructed tube of thin metal in direct communication with the upper part of the egg-chamber at the inner end and extended outside the incubator in a substantially horizontal direction to a sufficient extent to reduce the temperature of the escaping foul air before its escape from said tube and thus to prevent excessive draft within the egg-chamber.

3. The combination, in an incubator, of a non-conducting outer casing, egg-chamber walls of sheet metal within said outer casing, a hot-air space being formed between said sheet-metal walls and said outer casing, a suitable egg-chamber door, a vertical heat-flue external to said outer casing, a horizontal tube connecting said heat-flue with said hot-air space, a well in the outer casing, and an outlet-pipe extending upwardly from within said well through the top of the incubator, substantially as hereinbefore specified.

GEO. H. BOYD.

Witnesses:
JAS. L. EWIN,
A. M. SPOFFORD.

830 (Defendants' Exhibit P, Letters Patent No. 891,019 to L. Verna, June 16, 1908.)

No. 891,019. PATENTED JUNE 16, 1908.

L. VERNA.

DRYING ROOM.

APPLICATION FILED OCT. 22, 1907.

2 SHEETS—SHEET 1.

FIG. 1.

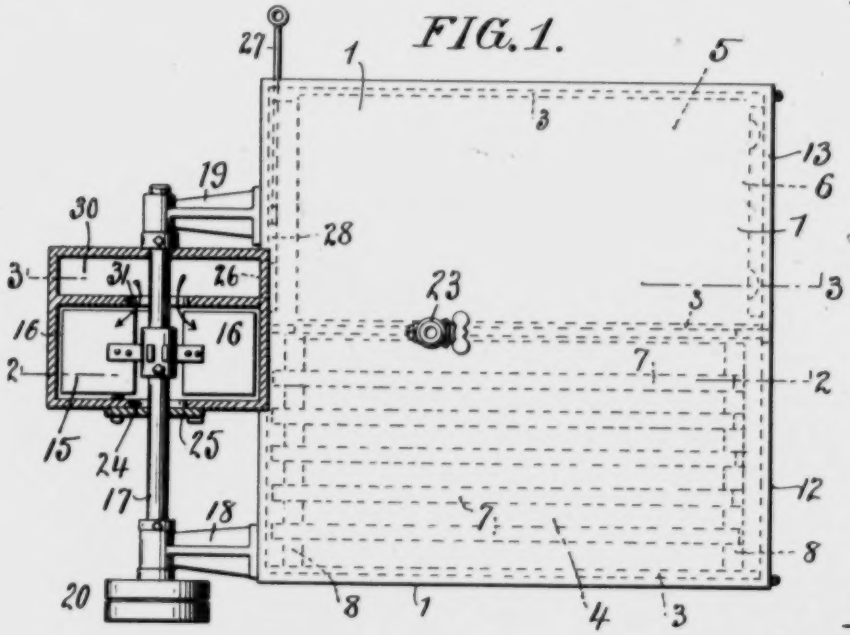


FIG. 6.

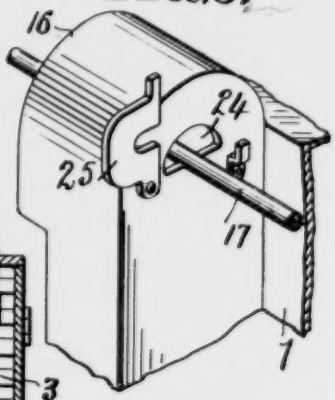
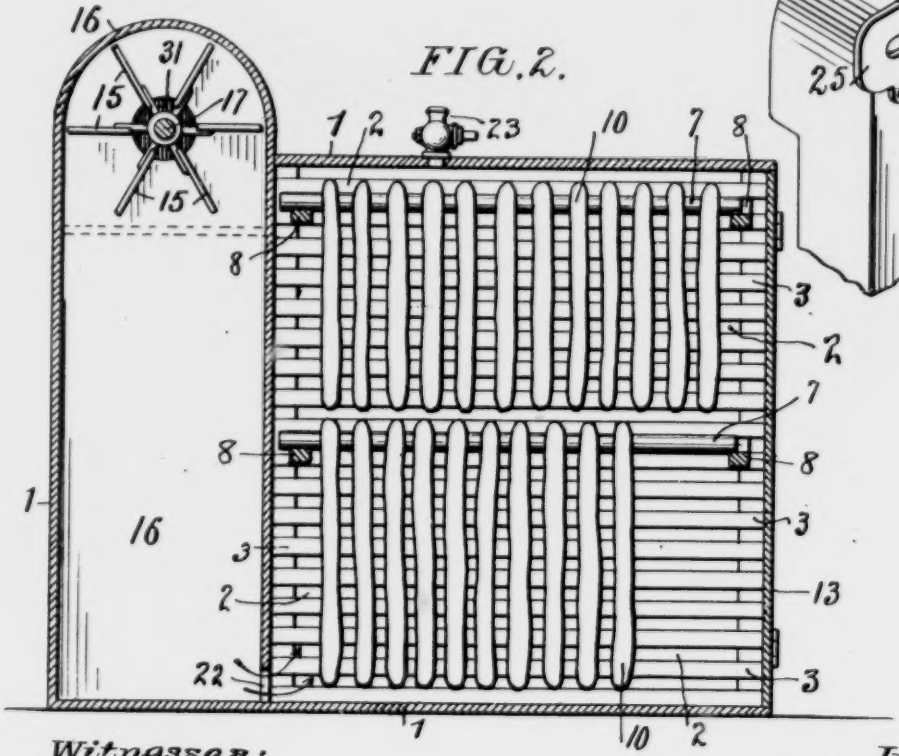


FIG. 2.



Witnesses:
M. Rodelsland
Hughmcchaney, Jr.

Inventor:
Luigi Verna
By his Attorney
F. DeWitt Goodwin

686 No. 891,019. PATENTED JUNE 16, 1908.

L. VERNA.

DRYING ROOM.

APPLICATION FILED OCT. 22, 1907.

2 SHEETS—SHEET 2.

FIG. 3.

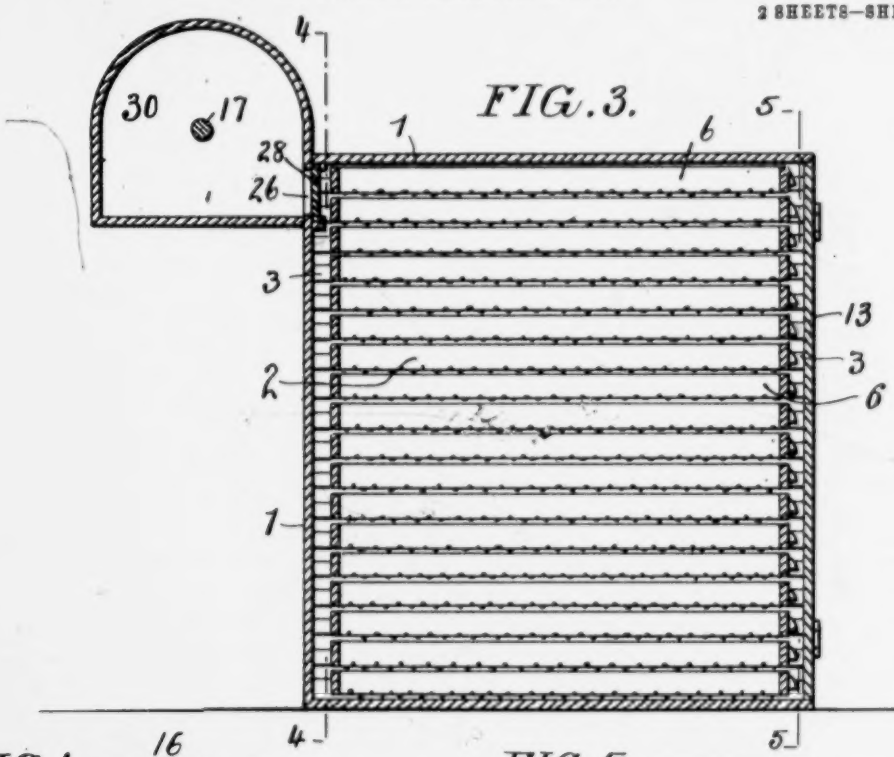


FIG. 4.

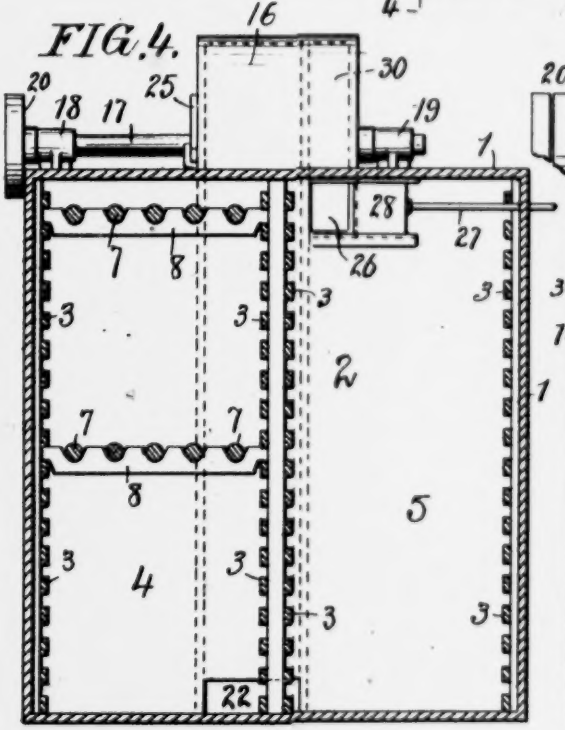
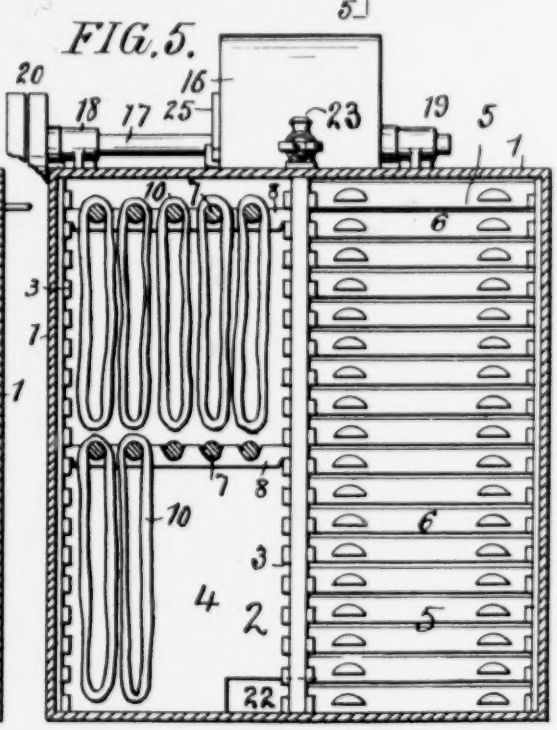


FIG. 5.



Witnesses:
M. R. Ioleland
Hughes Amey, Jr

Inventor:
Luigi Verna
By his Attorney
F. Dillett Goodwin

UNITED STATES PATENT

LUIGI VERNA, OF PHILADELPHIA, PENNSYLVA

DRYING-ROOM.

No. 891,019. Specification of Letters Patent. P

Application filed October 22, 1907. Serial No. 398,611.

To all whom it may concern:

Be it known that I, LUIGI VERNA, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Drying-Rooms, of which the following is a specification.

My invention relates to improvements in a drying machine and particularly relates to a machine for drying alimentary paste or dough used in the manufacture of macaroni.

The object of my invention is to construct a drying machine in which the dough can be quickly dried without causing the surface or crust of the dough to crack, this I accomplish by constructing the drying machine so that the dough may be subjected to an atmospheric pressure which will dry the dough uniformly without causing the surface to crack; a further object of my invention is to provide means for causing the air in the drying machine to circulate and also for admitting fresh air to the same when desired; these together with other novel features of construction of the parts of the machine, which will be more fully hereinafter described, constitute my invention.

Referring to the drawings: Figure 1. is a plan view of my improved drying machine showing the fan box in section; Fig. 2. is a vertical section on line 2—2 Fig. 1; Fig. 3. is a vertical section on line 3—3 Fig. 1; Fig. 4. is a vertical section on line 4—4 Fig. 3; Fig. 5. is a vertical section on line 5—5 Fig. 3; and, Fig. 6. is a perspective view of the fan box.

In the drawings 1 represents a casing forming the drying chamber 2, said casing 1 is preferably rectangular in form and is provided with racks 3 which divide the drying chamber into different compartments 4 and 5 into which compartments may either be placed the drawers 6, or poles 7, supported upon racks or guides 8, provided for that purpose. The drawers have bottoms formed of wire mesh, upon which is placed the short pieces of dough. The dough is also dried in long coils, such as shown at 10. These coils of dough are hung upon the poles 7, which are suspended between the said cross-pieces 8, which in turn rest upon the racks 3. The said cross-pieces 8 a either the drawers 6 used in any of the co

The drying machin doors 12 and 13, so as the drying chamber a

The drying machin 15, mounted in a fan supported in bearings said fan and is driven or any other suitable

The fan box 16 ex the drying machine, fan passes through th drying chamber, wh tight, so that the air sufficient pressure t dough contained in th upon the poles.

A stop-cock 23 is pr drying machine, whic duce the air pressure when desired.

The fan box is pro located opening 24 cover 25, as shown in opened to admit fresh

When it is desired drying chamber to cir formed at the top of t shown in Figs. 3 and of the rod 27, which is ing door 28, adapted aperture 26. When opened the air will be the drying chamber in 30, from which it is dra ing 31, into the fan box the fan box may be cl the drying chamber cover may be opened desired.

Having thus descri claim and desire to sec

In a drying room, casing forming a dryin located adjacent said having an aperture for ting air to the lower p chamber, a fan in said chamber having an o

PATENTED JUNE 16, 1908.

L. VERNA.

DRYING ROOM.

APPLICATION FILED OCT. 22, 1907.

2 SHEETS—SHEET 2.

FIG. 3.

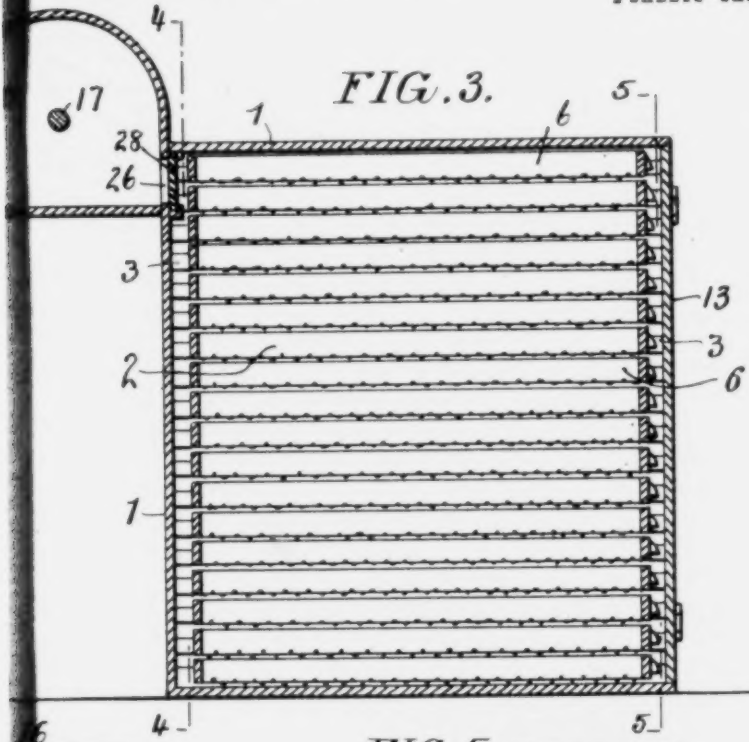
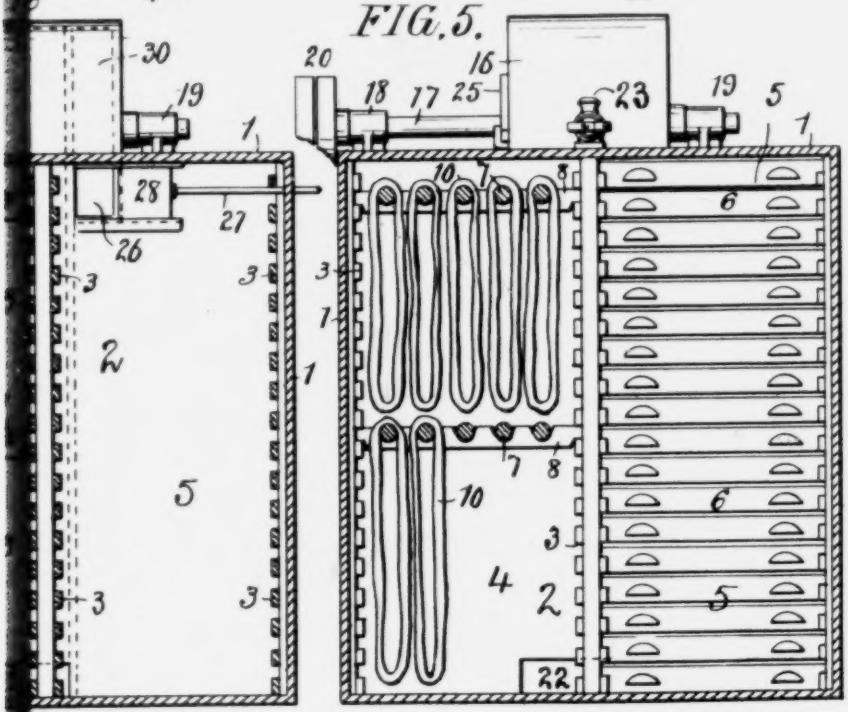


FIG. 5.



Inventor:
Luigi Verna
By his Attorney
F. Dellett Goodwin

Witness, Jr

UNITED STATES PATENT OFFICE.

LUIGI VERNA, OF PHILADELPHIA, PENNSYLVANIA.

DRYING-ROOM.

No. 891,019. Specification of Letters Patent. Patented June 16, 1908.

Application filed October 22, 1907. Serial No. 398,611.

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The drying machine is provided with large doors 12 and 13, so as to make the interior of the drying chamber accessible.

The drying machine is provided with a fan 15, mounted in a fan box 16. A shaft 17, supported in bearings 18 and 19, carries the said fan and is driven by the belt wheels 20, or any other suitable means.

The fan box 16 extends to the bottom of the drying machine, where the air from the fan passes through the aperture 22 into the drying chamber, which is practically air tight, so that the air will be held under a sufficient pressure to uniformly dry the dough contained in the drawers or suspended upon the poles.

A stop-cock 23 is provided at the top of the drying machine, which may be opened to reduce the air pressure in the drying chamber when desired.

The fan box is provided with a centrally located opening 24 having an adjustable cover 25, as shown in Fig. 6; which may be opened to admit fresh air to the fan.

When it is desired to cause the air in the drying chamber to circulate, the aperture 26, formed at the top of the drying chamber, as shown in Figs. 3 and 4, is opened by means of the rod 27, which is connected with a sliding door 28, adapted to tightly close said aperture 26. When said aperture 26 is opened the air will be drawn from the top of the drying chamber into the return chamber 30, from which it is drawn, through the opening 31, into the fan box 16. The cover 25, of the fan box may be closed so that the air in the drying chamber will circulate, or the cover may be opened to admit fresh air as desired.

Having thus described my invention I claim and desire to secure by Letters Patent:

In a drying room, the combination of a casing forming a drying chamber, a fan box located adjacent said drying chamber and having an aperture formed therein for admitting air to the lower portion of said drying chamber, a fan in said fan box, said drying chamber having an aperture formed in the

upper portion thereof, a return chamber communicating with said aperture in the upper portion of said drying chamber and with said fan box, means for closing said last mentioned aperture, racks formed in said drying chamber and means supported upon said racks for carrying the articles to be dried.

In testimony whereof I affix my signature in presence of two witnesses.

LUIGI VERNA.

Witnesses:
JOSEPH B. LANNING,
J. F. G. ATTLIN.

836 (Defendants' Exhibit P, Letters Patent No. V. C. Koons, March 30, 1909.)

a return chamber com-
aperture in the upper
chamber and with said
ing said last mentioned
d in said drying cham-
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es to be dried.

In testimony whereof I affix my signature in presence of two witnesses.

LUIGI VERNA.

Witnesses:
JOSEPH B. LANNING,
J. F. G. ATTLIN.

836 (Defendants' Exhibit P, Letters Patent No. 916,454 to V. C. Koons, March 30, 1909.)

690

V. C. KOONS.

INCUBATOR.

APPLICATION FILED JULY 3, 1907.

916,454.

Patented Mar. 30, 1909.

4 SHEETS—SHEET 1.

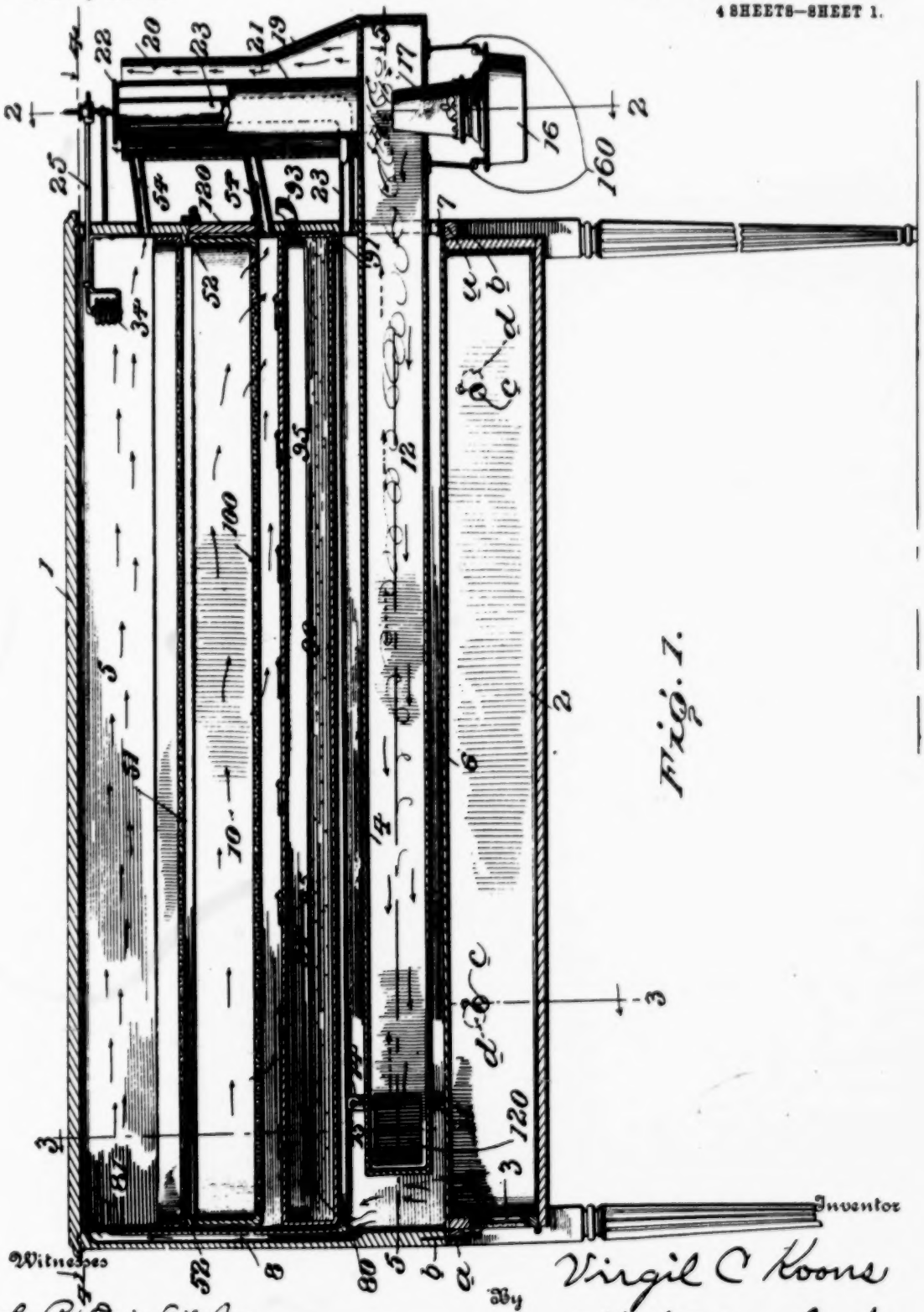

Fig. 1.

Witnesses

C. P. Wright Jr.

E. R. Peck

Inventor

Virgil C. Koons

By Hubert E. Peck

Attorney

692

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4 SHEETS—SHEET 2.

Fig. 2.

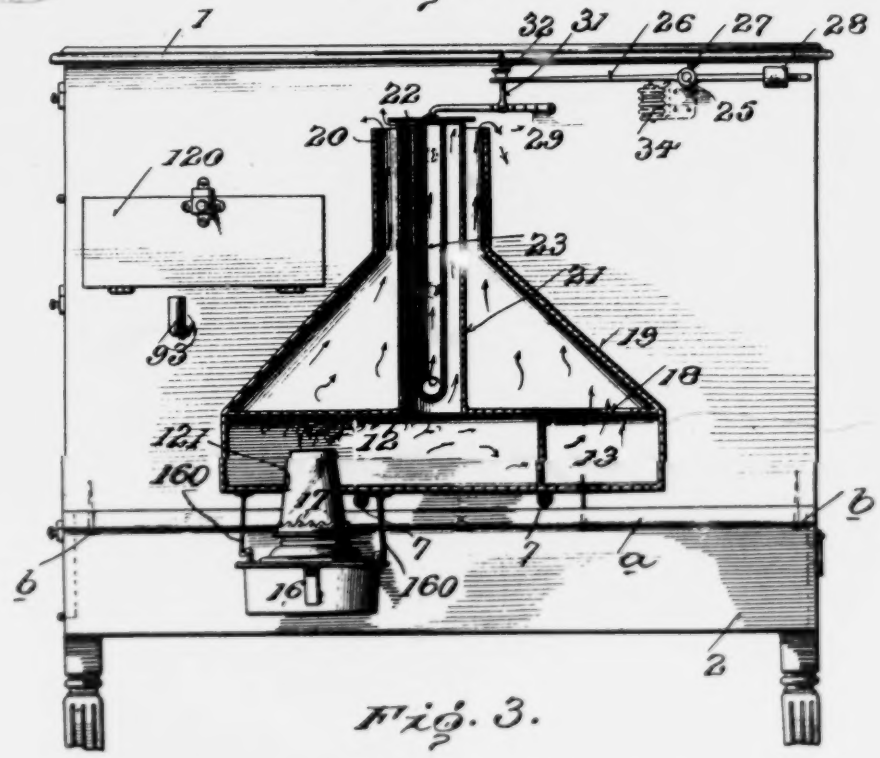
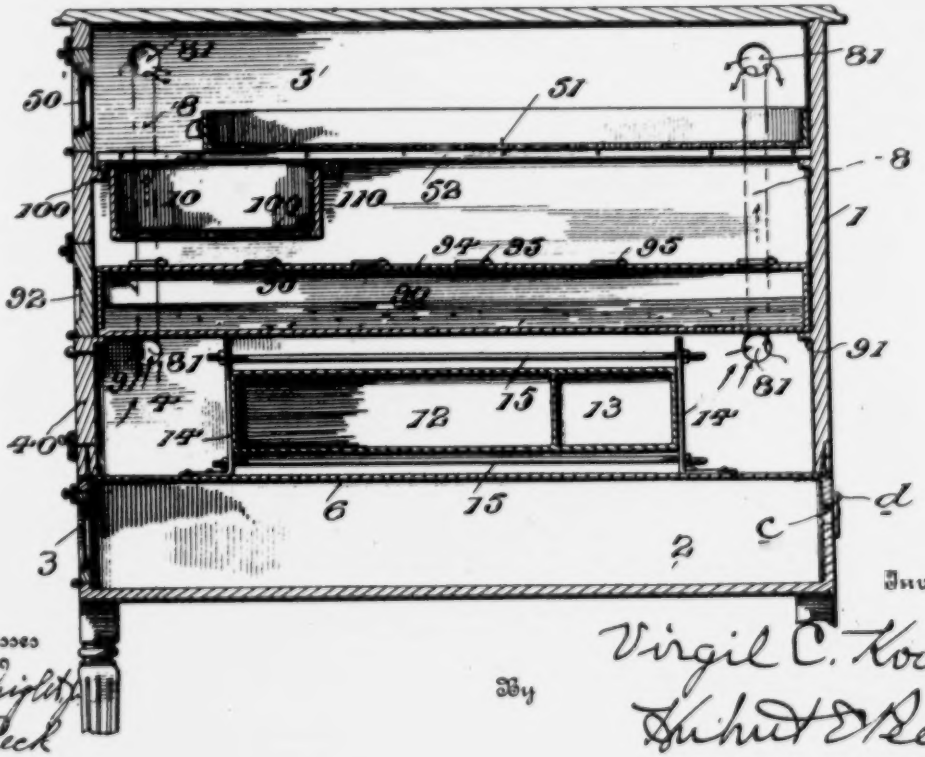


Fig. 3.



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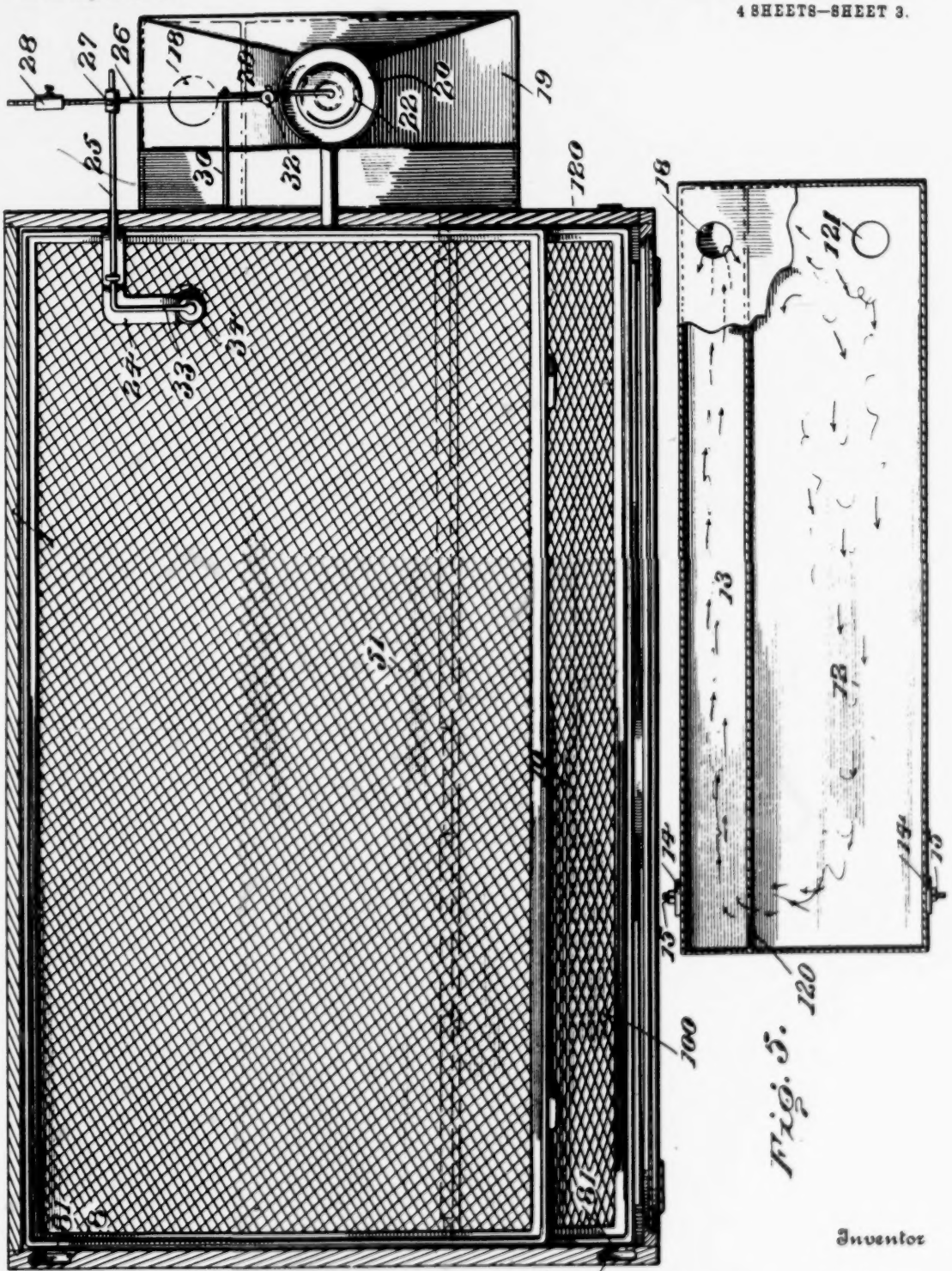

Fig. 3.

Witnesses

C. P. Wright Jr.

E. R. Peck

Fig. 4.

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By Virgil C. Koons

Hubert E. Peck

Attorney

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4 SHEETS—SHEET 4.

Fig. 6.

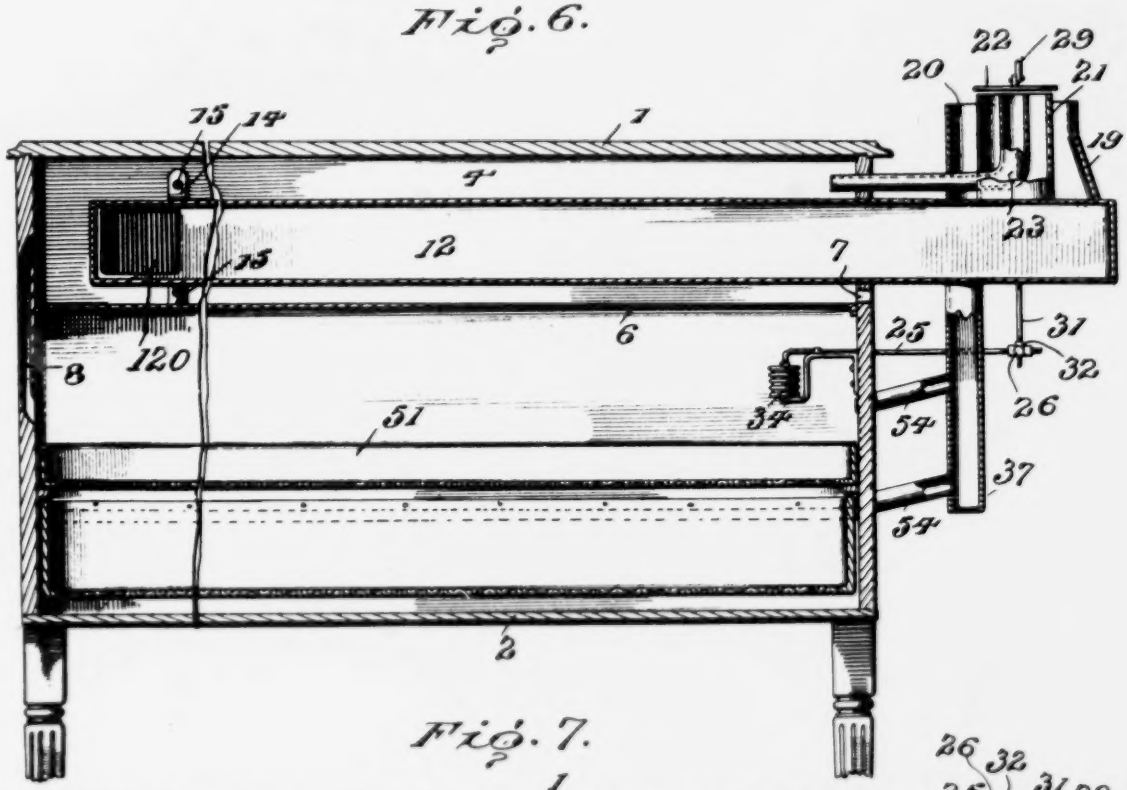
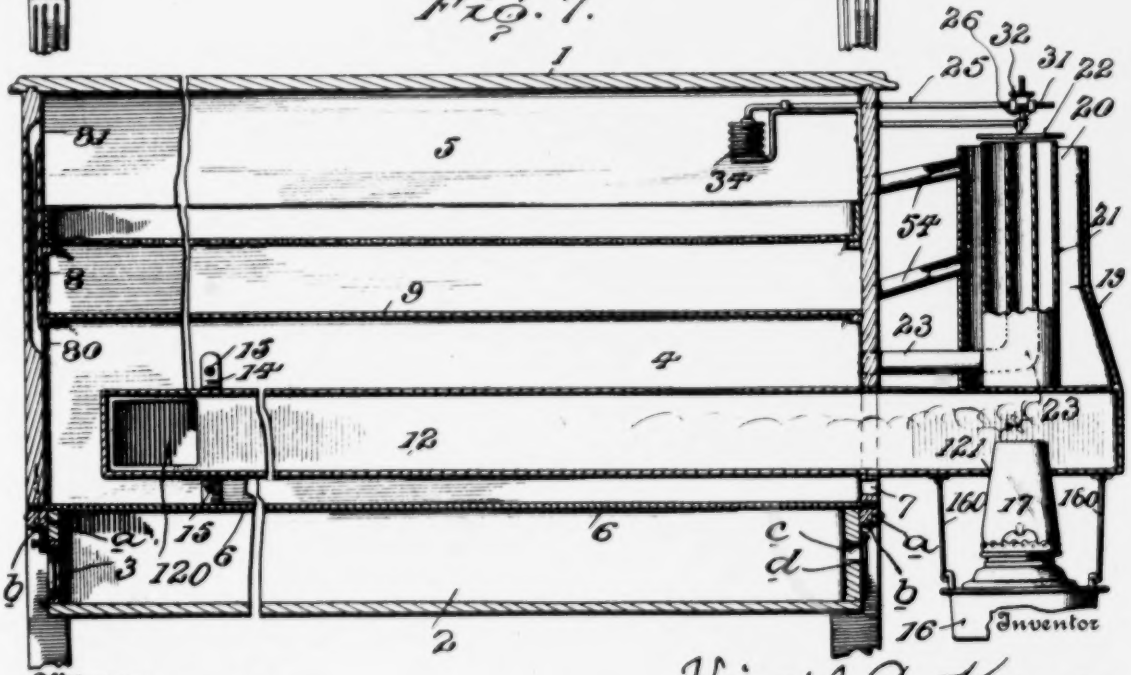


Fig. 7.



Witnesses
C. P. Wright, Jr.
E. R. Peck

Virgil C. Koons
By Kuhnt & Peck
Attorney

UNITED STATES PATENT

VIRGIL C. KOONS, OF COLORADO SPRINGS, COLORADO, ASSIGNO
MANUFACTURING COMPANY, OF COLORADO SPRINGS, COLOR
COLORADO.

INCUBATOR.

No. 916,454. Specification of Letters Patent.

Application filed July 3, 1907. Serial No. 382,084.

To all whom it may concern:

Be it known that I, VIRGIL C. KOONS, a citizen of the United States, residing at Colorado Springs, El Paso county, Colorado, have invented certain new and useful Improvements in Incubators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to certain improvements in incubators; and the objects and nature of the invention will be readily understood by those skilled in the art in the light of the following explanations of the structures shown in the accompanying drawings as my preferred embodiments from among other constructions within the spirit and scope of my invention.

My invention consists in certain novel features in construction and arrangement and in combinations as more fully and particularly set forth hereinafter.

Referring to the accompanying drawings: Figure 1, is a longitudinal section taken vertically through the incubator. Fig. 2, is a vertical cross section taken on the line 2—2, Fig. 1. Fig. 3, is a vertical cross section in the plane of the line 3—3, Fig. 1. Fig. 4, is a horizontal section on the line 4—4, Fig. 1. Fig. 5, is a longitudinal horizontal section on a reduced scale on the line 5—5, Fig. 1. Figs. 6 and 7, are vertical longitudinal sections illustrating modified arrangements.

The incubator comprises a suitably formed and constructed case, or inclosure 1. At the bottom or under side of the incubator case, I can, if desired, arrange a brooder chamber 2, in which the chicks can be kept until placed in a stationary or other regular brooder. This brooder 2, usually consists of a rectangular box, open at the top and detachably secured in any suitable manner to the incubator case usually forming a downward continuation thereof with the bottom wall of the incubator case forming the top wall or ceiling of said brooder. For instance, cleats or strips *a*, can be secured along the outer faces of the upper edges of the end walls of the brooder, and removable vertical screws *b*, can be passed up through the cleats and into the lower edges of the end walls of the incubator casing. Said brooder is usually formed with openings *c*, in its closed and opene covers or dampers ing normally close door 3, usually in t

The interior of t ally divided hori chamber 4, and an e I show the heated, heating, chamber throughout the leng part of the case, a brooder 2, with th metal floor or par bottom of the case heating chamber brooder, so that th through said floor chamber.

Suitable means heating chamber f ber except for the said chambers thr air flues 8. For in horizontal usually forming the ceilin chamber and the fl chamber, although experience, I prefer to form the partitio tank.

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In the hatching ch for carrying the egg able number of egg of any suitable or a material. In the dr zontally arranged eg mediate the height and sliding and supp cleats 52, secured to tray is inserted an front opening closed

V. C. KOONS.

INCUBATOR.

APPLICATION FILED JULY 3, 1907.

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4 SHEETS—SHEET 4.

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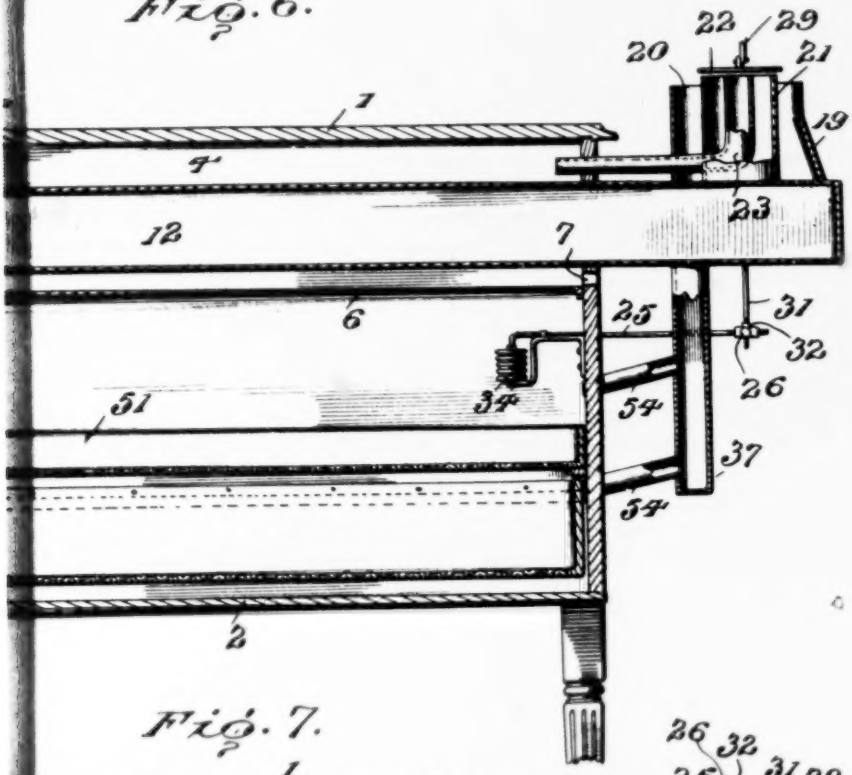
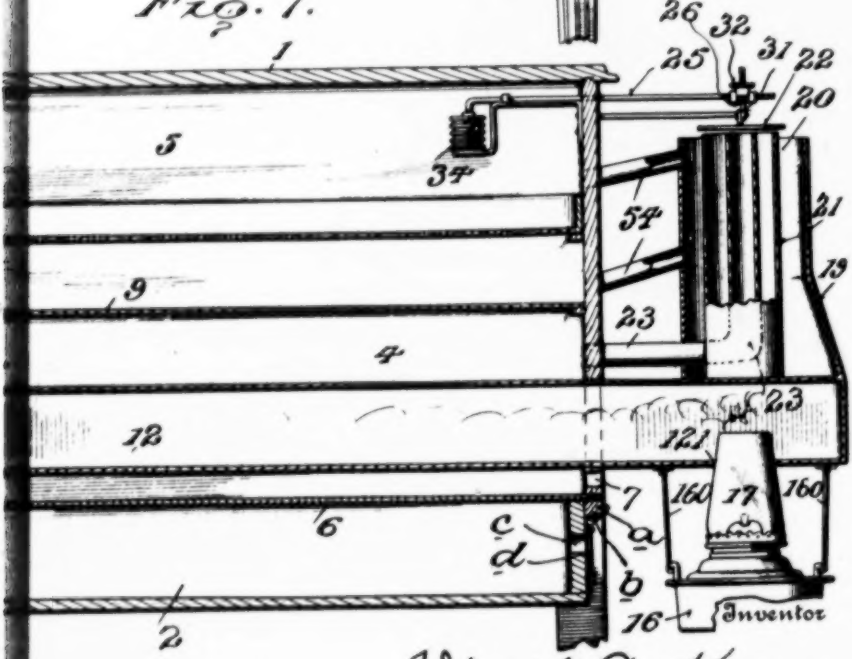


Fig. 7.



Virgil C. Koons

By Kuhnt & Peck

Attorney

UNITED STATES PATENT OFFICE.

VIRGIL C. KOONS, OF COLORADO SPRINGS, COLORADO, ASSIGNOR TO THE CONTINENTAL MANUFACTURING COMPANY, OF COLORADO SPRINGS, COLORADO, A CORPORATION OF COLORADO.

INCUBATOR.

No. 916,454. Specification of Letters Patent. Patented March 30, 1909.

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The interior of the incubator casing is usually divided horizontally into a heating chamber 4, and an egg or hatching chamber 5. I show the heated, or what might be termed heating, chamber 4, extending horizontally throughout the length and width of the lower part of the case, and immediately above the brooder 2, with the horizontal usually sheet metal floor or partition 6, which closes the bottom of the case and forms the floor of the heating chamber and the top wall of the brooder, so that the heat can radiate down through said floor 6, to heat the brooder chamber.

Suitable means are provided to close the heating chamber from the hatching chamber except for the communication between said chambers through the medium of hot air flues 8. For instance, in Fig. 7, I show horizontal usually sheet metal partition 9, forming the ceiling or top of the heating chamber and the floor of the egg or hatching chamber, although as at present advised by experience, I prefer, as hereinafter described to form the partition or division by a water tank.

I usually provide the heating chamber with a front opening normally closed by a removable or hinged door 40. I also usually provide the incubator casing with a front opening approximately across the full width of the hatching chamber and normally closed by a hinged door 50, usually provided with one or more glass panels or the like through which the interior of the chamber can be observed.

In the hatching chamber, I arrange means for carrying the eggs, for instance, any suitable number of egg trays can be employed of any suitable or approved construction or material. In the drawings, I show one horizontally arranged egg tray 51, arranged intermediate the height of the hatching chamber and sliding and supported on horizontal end cleats 52, secured to the casing ends. This tray is inserted and removed through the front opening closed by door 50, and has an

egg supporting floor of open-work or reticulated material through which the air can freely circulate around the eggs.

At one end fresh or outside air is admitted into the lower part of the heating chamber 4, through one or more air ducts 7, opening from the exterior through the end wall of the casing which carries the lamp heater, hereinafter described. From the opposite end of the heating chamber one or more vertical flues 8, convey the heated air upwardly and discharge the same into the upper portion of an end of the hatching chamber. In the specific example illustrated, I show the vertical flues 8, arranged at the opposite corners of said end and within the end wall with air inlets 80, at their lower ends from the upper portion of the heating chamber end and at their upper ends having outlets 81, into the upper portion of the corresponding end of the egg chamber. At the opposite end of the egg or hatching chamber, from the heated air inlets, I provide one or more outlet or discharge passages 54, opening through the casing end, said discharge or outlet pipes or passages being usually arranged above and below the egg tray so that the heated air will circulate throughout the hatching chamber and around the eggs; the draft through the chamber being maintained by the outward passage of air in the outlet or discharge pipes or passages 54.

A suitable heating system is provided for the heating chamber, for the purpose of maintaining the desired temperature in the hatching chamber and other portions of the apparatus. Various systems, within the scope of certain features of my invention, can be provided for this purpose. In the specific example illustrated, I show closed heating pipes, flues or drums longitudinally arranged within said chamber and adapted to heat the air therein, said flues removably extending through one end of the incubator casing and at the exterior of said casing, receiving the heating medium, as from a lamp, and provided with the exhaust or discharge. I show a hollow sheet metal heating drum 12, within and arranged approximately throughout the length of the heating chamber and at the lamp or heat receiving end projecting through the casing end and a distance beyond the exterior thereof. A sheet metal return drum or flue 13, is arranged beside and throughout the length of the heating drum and also extends through the casing end to the exterior thereof. At their inner or rear ends these two drums communicate through a discharge opening 120 from the heating drum to the return drum. These heating drums or flues are preferably secured together and are closed against communication between their interiors and the interior of the heating chamber to prevent escape of gases or products of combustion into the heating chamber. Said drums are supported a distance above the bottom or floor of the heating chamber and are also arranged below the top wall thereof so that the air can circulate around the drums. At their outer end portions the drums removably pass through and are suitably supported in the casing end, while at their inner ends the drums are supported by uprights or standards 14, secured to the floor 6, of the heating chamber and arranged on opposite sides of the drums and connected above and below the drums by cross bolts 15, having nuts so that the bolts can be tightened to clamp the uprights to the drums in the desired vertical adjustment. The bolts can be loosened when it is desired to raise or lower the drums and then tightened to clamp the drums in the desired position. Also the bolts can be loosened and the drums slipped out through the end of the casing for cleaning or repair. Any suitable heater can be employed, although in the drawings I show removable lamp 16, at the exterior of the casing and suitably hung as by hooks 160 from the heating drum, with its metal chimney 17, removably projecting up into the exterior end of said drum 12 through an opening 121 in the bottom wall thereof. The outer or exterior end of the return flue or drum is arranged beside the exterior or heater receiving end of the heating drum, and is provided with a top discharge opening or outlet 18.

A vertically disposed upwardly converging sheet metal hood or casing 19, is arranged at the exterior of the casing end and is secured on and rises from and incloses the top surfaces of the projecting ends of the heating and return flues. This hood is arranged directly over the lamp receiving end of the heating flue and directly over the discharge end of the return flue so that the top discharge 18, of the return flue opens into said hood. The hood converges upwardly to a reduced top discharge 20. The portion of the top wall of the heating flue against which the heat of the lamp directly impinges forms a part of the floor of said hood and hence the air in said hood is heated and rises thereby creating an upward draft through said hood and out through the top discharge 20, thereof, whereby a suction is created through the return flue discharge 18, maintaining a draft through said return flue and from the inner end of the heating flue. By this means the necessary draft is kept up through the heating and return flues to maintain proper combustion with a full lamp flame, whereby the lamp can be kept burning to the desired extent and the heat will be utilized to the maximum. Furthermore by thus maintaining an even forced draft, the heat is equally distributed throughout the heating flues and can be carried to a maxi-

mum distance laterally or horizontally from the lamp. Such a system permits the use of incubators of maximum capacity and horizontal length in connection with the one lamp or single heating system.

I usually arrange the end fresh air inlets 7, into the heating chamber, below the heating flues and into the space between the bottoms of said flues and the floor of the heating chamber, whereby said fresh or cool air passes along and around said flues and is heated to the desired extent before reaching the heated air offtakes at the opposite end of the heating chamber.

To aid in maintaining the desired circulation of air through the heating and hatching chambers, I usually arrange the discharge pipes 54, above and below the egg tray and at their outer ends opening into the upper end portion of the hood or casing 19, a distance below the upper or discharge end 20, thereof. The upward draft through said hood 19, tends to draw the air through the pipes 54, and from the hatching chamber to maintain the desired circulation through said chamber, and the vitiated air from said hatching chamber is thus drawn off and discharged through and from the hood with the waste products from the heating system.

I provide means for regulating or controlling the temperature of the hatching chamber and for relieving the heating system from the heated products when the same becomes overheated. Various means can be employed for this purpose, within the spirit and scope of my invention, but in the specific example illustrated, I show a vertical escape pipe 21, arranged about concentrically within the hood 19, with its upper open end about flush with the open top or discharge end of the hood. At its lower end this pipe 21, opens into the heating flue 12, through the top wall thereof. This escape pipe 21, is normally closed against the escape of heat or products therethrough from the heating flue, by suitable means, such as a flat vertically movable cap or damper 22, resting on and closing the top otherwise open end of said escape pipe 21. I can also provide means to reduce the heat in the heating chamber 4, when the temperature rises beyond the maximum and the escape 21, is opened, by permitting direct outflow of heated air from said chamber without passing said air through or into the hatching chamber 5. For instance, this result can be accompanied by an escape pipe 23, arranged vertically and about concentrically within escape pipe 21 and having its open upper end about flush with the open upper end of pipe 21, so that both pipes 21 and 23, will be simultaneously closed and opened by the single damper 22, said damper being of less diameter than the discharge outlet of the hood 19, so that the said outlet is always

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Any suitable thermostat actuated means can be provided for controlling the damper 22; the thermostat being usually arranged at any suitable location within the hatching chamber. For instance, I show a horizontal angular metal bracket 24, arranged within the hatching chamber and at one end fixed to the end wall of said chamber. A horizontal rock shaft 25 is mounted on and supported by said bracket and passes loosely through the casing end and projects beyond the end of the incubator casing. A lateral arm 26, is adjustably secured, by sleeve and set screw 27, to the exterior end of this shaft and projects therefrom in opposite directions. One end of said arm 26, is provided with adjustable counterweight 28. The opposite end of arm 26, is connected to raise the damper 22, and is arranged above and preferably parallel with the vertically swingable arm 29, to the free end of which the damper 22 is fixed and by which said damper is carried and controlled. This damper carrying arm 29, is pivoted to a horizontal post 30, projecting from the end wall of the incubator casing. The arm 26, is coupled to the damper arm 29, by a vertical lift rod 31, at its lower end pivotally joined to arm 29, and with its upper longitudinally threaded end passing loosely through a vertical opening in arm 26, and provided with an adjustable nut 32, engaging said arm 26, and by which the normal distance between arms 26 and 29, can be varied. Within the hatching chamber, shaft

25, is formed with a crank arm 33, arranged over the lateral end of bracket 24, and any suitable thermostat 34, is carried by said lateral horizontal end of the bracket and interposed between the same and the outer end of crank arm 33, so that the movement of the thermostat will raise or lower crank arm 33, and consequently rock shaft 25, to raise or lower the damper 22, through the medium of the connections described. The devices can be so set and adjusted that when the temperature in the hatching chamber passes above a certain degree, the thermostat will then operate to raise damper 22, and hold the same raised until the temperature in the hatching chamber drops to the desired degree. The adjustments are such that the parts can be accurately set to raise the damper when a certain degree of temperature is reached in the hatching chamber, and the damper is quickly raised and controlled particularly by reason of the location of the pull rod 31, near the fulcrum of damper arm 29, and also by locating shaft arm 26, over and extending in the same direction as arm 29, although I do not wish to so limit all features of my invention.

Any suitable means can be provided, in or communicating with the hatching chamber, to receive the chicks as hatched from the eggs on the egg tray. I usually provide a suitable receptacle, or the like, in the hatching chamber, to receive the chicks from the tray and in which the chicks are maintained for a suitable period after hatching and until thoroughly dried, preparatory to being placed in the auxiliary brooder 2, if such brooder be employed as an adjunct to the incubator. In the specific example illustrated, this chick drying receptacle or chamber, is formed by a removable box or drawer 10, having a floor, sides and ends and an open top, and arranged below the plane of the egg tray so that the chicks can drop from the egg tray into said receptacle without danger of injury to the chicks. I show the egg tray in length equal to the full length of the hatching chamber, but in width less than the width of the hatching chamber so that when said tray is slipped into the hatching chamber to the rear wall thereof, the front edge of the egg tray will be located a distance rearwardly from the glass paneled front door 50, to the hatching chamber. I show the chick receptacle arranged longitudinally of the hatching chamber between the front wall thereof and the front edge of the egg tray and below the horizontal plane of the top of the front edge of the egg tray, so that the chicks hatched on the tray will travel toward the front edge of the tray, attracted by the light through door 50, and drop into the drawer or receptacle 10. This receptacle is arranged in the hatching chamber and is preferably formed with a reticulated or wire netting floor or bottom 100, permitting free passage therethrough of the heated and moisture laden air so that the circulation of air in the hatching chamber passes through said chick receptacle as well as through the egg tray. The chick drawer or receptacle is shown supported and sliding on the cleats 110, and said drawer can be inserted and removed through an end of the incubator casing, while the egg tray can be inserted or removed over the chick drawer. An opening is formed in an end wall of the incubator casing for the passage of the chick drawer and this opening can be closed by any suitable means or in any suitable manner, as by a separate door 120, as indicated in Figs. 2 and 4.

Any suitable means can be provided to supply the desired degree of moisture in the hatching chamber. I can arrange one or more water pans in the heating chamber, although as at present advised by experiment, I prefer to form the floor of the hatching chamber and top of the heating chamber by a shallow horizontal metal tank 90, forming a partition between the heating and hatching chamber and preferably removably resting on cleats 91, secured at the inner faces of the walls of the incubator casing. I usually form the tank to slide into the incubator casing from the front, through a front opening normally closed by hinged front door 92. At one end the tank can be formed with a threaded hole adapted, when the tank is in its normal position, to register with a hole through an end of the incubator casing. When the tank has been slipped into position in the casing, an elbow or bent nozzle or funnel 93, can be passed through said hole in the casing end and screwed into the hole in the tank end with the upwardly extending funnel end in an upright position with its top at the exterior of the casing and above the water level in the tank. The tank can be supplied with water through this nozzle which also acts as vent for escape of surplus vapor. The tank can be formed at the top to permit passage of the vapor from the water in the tank directly, up into the hatching chamber through the wire net or open floors of the egg tray and chick box, receptacle or drawer, for instance, if so desired the tank can be formed with a top 94, having a suitable number of perforations therethrough for escape of vapor. Also if desired, flat caps 95, can be pivoted on the top 94, a cap for each perforation so that each perforation can be closed if desired by swinging its cap over the same. By this arrangement, the amount of vapor discharged into the hatching chamber can be controlled.

I do not as at present advised, by experience, wish to limit my invention, to incubators of what might be termed the under or bottom heating type, that is the type where the heating devices are arranged below the

hatching chamber, for I can, in my incubator, arrange the hatching chamber below the heating chamber, and cause the heated air to circulate down from the heating chamber to and through the hatching chamber, as shown by Fig. 6. In this arrangement, the heating chamber 4 is arranged in the upper part of the incubator casing, and the hot air flues 8, pass down therefrom to the hatching chamber immediately below the heating chamber, and at the lamp end of the casing, the outlets 54, from the hatching chamber open into a hollow downward extension 37, of the hood 19, and through which an upward draft is maintained by the heat from the lamp rising through the upper part of the hood as hereinbefore described.

The heating system disclosed can be employed in other forms of incubators than those disclosed herein, and can also be used in brooders or other chicken culture apparatus, as well as for heating other devices. The hood 19, or its equivalent, can also be employed in other connections for maintaining a forced draft through various forms or arrangements of heating flues or drums.

It is evident that various changes and modifications might be resorted to, that parts might be omitted or elements added without departing from the spirit and scope of my invention, hence I do not wish to limit myself to the exact constructions and arrangements shown.

What I claim is:—

1. An incubator comprising a casing having a heated chamber arranged longitudinally thereof and a hatching chamber arranged longitudinally thereof, a hot air duct being provided for conveying heated air from an end of the heated chamber and discharging the same into an end of the hatching chamber, a heating drum longitudinally arranged within the heated chamber, said drum being arranged within said chamber to form air spaces around the drum, means for heating said drum, said heated chamber having a fresh air inlet below said drum and at the end of the chamber opposite said hot air duct, whereby the air in said chamber passes around said drum and flows throughout the length of the chamber to said duct, the end of the hatching chamber opposite said duct being provided with a hot air outlet, and thermostatic controlled means for regulating the temperature in said hatching chamber.

2. An incubator having a heated chamber, a hatching chamber, hot air flues from one end of the heated chamber discharging into an end of the hatching chamber, said-hatching chamber provided with an air outlet, a heating drum in the heated chamber provided with a heater, said heated chamber provided with an end air inlet below said heating drum, said heated chamber forming air spaces around
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The heating system disclosed can be employed in other forms of incubators than those disclosed herein, and can also be used in brooders or other chicken culture apparatus, as well as for heating other devices. The hood 19, or its equivalent, can also be employed in other connections for maintaining a forced draft through various forms or arrangements of heating flues or drums.

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What I claim is:—

1. An incubator comprising a casing having a heated chamber arranged longitudinally thereof and a hatching chamber arranged longitudinally thereof, a hot air duct being provided for conveying heated air from an end of the heated chamber and discharging the same into an end of the hatching chamber, a heating drum longitudinally arranged within the heated chamber, said drum being arranged within said chamber to form air spaces around the drum, means for heating said drum, said heated chamber having a fresh air inlet below said drum and at the end of the chamber opposite said hot air duct, whereby the air in said chamber passes around said drum and flows throughout the length of the chamber to said duct, the end of the hatching chamber opposite said duct being provided with a hot air outlet, and thermostatic controlled means for regulating the temperature in said hatching chamber.

2. An incubator having a heated chamber, a hatching chamber, hot air flues from one end of the heated chamber discharging into an end of the hatching chamber, said hatching chamber provided with an air outlet, a heating drum in the heated chamber provided with a heater, said heated chamber provided with an end air inlet below said heating drum, said heated chamber forming air spaces around said drum and communicating with said air inlet at one end of the chamber and with said flues at the opposite end of the chamber.

3. An incubator having a horizontally disposed heated chamber, and a hatching chamber, a heated air flue from the heated chamber to the hatching chamber, the hatching chamber being provided with an air outlet, and the heated chamber with an air inlet, heated flues arranged longitudinally within the heating chamber and above the floor thereof and projecting through and beyond an end thereof, said flues provided with a discharge at the exterior of the chamber, and a heater arranged at the exterior of the chamber and opening into one of said flues to heat the same.

4. An incubator having an internal heated chamber extending throughout the length thereof and a hatching chamber parallel with and adjacent to the heated chamber, the heated chamber provided with an air inlet at one end, a vertical hot air flue in the opposite end of the incubator casing and opening into the upper portion of the heated chamber and into the upper portion of the hatching chamber, said hatching chamber at its opposite end provided with an air outlet, a normally closed thermostatic-controlled direct heated-air outlet from said heated chamber, and means within the heated chamber for heating the air therein.

5. In chicken culture apparatus a casing comprising a heated chamber, heating flues therein comprising a main flue and a return flue, said flues being arranged adjacent to each other and communicating at their inner ends, a heater opening into the outer end of the main flue through the bottom thereof, a hood inclosing the top portions of the outer ends of said flues above said heater and having a top discharge opening, the return flue having a discharge opening into said hood, whereby the air in the hood is heated by said heater thereby creating an upward draft in the hood and a suction through the return flue discharge whereby the draft is maintained through the main and return flues.

6. In combination, a casing having a chamber to be heated, an elongated heating flue arranged therein, an elongated return flue at its inner end communicating with and receiving the heated products from the inner end of the heating flue and having a discharge opening at its outer or opposite end, a heater opening through the bottom of the opposite or outer end of said heating flue and discharging its products upwardly thereinto and against the top wall thereof, and a discharge hood mounted on said heating flue and inclosing said top wall thereof and rising vertically therefrom and having a contracted top discharge opening, said discharge open-

ing of the return flue opening into said hood, for the purposes substantially as described.

7. In combination, a casing having a chamber to be heated, an elongated heating flue arranged horizontally in said chamber, the outer end of said flue having a bottom opening, a heating lamp adapted to discharge its products vertically into said flue and against the top wall thereof, an elongated return flue at its inner end communicating with the inner end of said heating flue, and at its outer end having a vertically disposed discharge hood arranged over the outer end of said heating flue under which the heating lamp is located, and having a contracted top discharge opening, whereby the heat radiated upwardly from said lamp and through said wall maintains an upward draft through said hood.

8. In chicken culture apparatus, a heating apparatus comprising elongated horizontally disposed main and return flues communicating at their inner ends to carry the heated products through the main flue and from the inner end thereof back through the return flue, the main flue at its outer end adapted to receive the heated products from a heating lamp arranged below the same, the return flue being arranged beside the main flue and having a discharge opening at its outer end for the escape of the heated products, and means arranged over said discharge and adapted to be heated by said lamp for maintaining a forced draft through said main and return flue and out through said discharge.

9. Chicken culture apparatus having, a chamber to be heated, a heating flue therein adapted to receive heated products from a heating lamp and having a vertical discharge, and a hot air discharge pipe from said heated chamber direct to the exterior of the chamber, means normally closing said pipe, and heat controlled mechanism for actuating said means to open said pipe.

10. Chicken culture apparatus having, a chamber to be heated, and a hatching chamber having an air outlet, said first mentioned chamber having a fresh air supply, a heated air passage connecting said chambers, a normally closed direct air outlet from said chamber to be heated, and means for opening said outlet, for the purposes substantially as described.

11. Chicken culture apparatus having, a heated chamber having a fresh air inlet, a hatching chamber having an outlet, a passage for heated air from the heated chamber to said hatching chamber, a direct outlet pipe from the heated chamber to the atmosphere for cooling said chambers, a damper normally closing said pipe, and thermostat actuating means for opening said damper, said actuating means being controlled by the temperature of said hatching chamber.

12. An incubator comprising a casing having a hatching chamber and a heated chamber, means for heating the heated chamber comprising a heating flue adapted to receive the heated products of a heating lamp and having a vertical discharge, means being provided to normally permit circulation of fresh air into and through the heated chamber, and therefrom into and through the hatching chamber, said means comprising a discharge duct from the hatching chamber into said vertical discharge, normally closed means for discharging the heated products direct from said flue without passing the same therethrough, normally closed means for discharging heated air direct from said heated chamber to stop the normal circulation from the heated chamber to the hatching chamber, and a thermostatic regulator for opening and closing said two last mentioned means.

13. Chicken culture apparatus having, a chamber to be heated, heating flues therein comprising a main flue and a return flue having a discharge at its outer end, said flues communicating at their inner ends to carry the heated products throughout the lengths thereof, said main flue adapted to receive at its outer end the heated products of a heating lamp and having a direct vertical discharge pipe opening through the top wall of its outer end, a direct air outlet pipe from said chamber having its upper outlet end arranged within the upper outlet end of said discharge pipe, a single damper normally closing the upper ends of said two pipes, and thermostat actuating means for moving said damper to open said pipes.

14. An incubator having a hatching chamber and a heated chamber provided with a direct air outlet with a vertical discharge end, means for heating said discharge end to accelerate the discharge therefrom, thermostatic-controlled means normally closing said outlet, and means to normally maintain a constant circulation of fresh air into and through the heated chamber and therefrom into and through the hatching chamber and discharging therefrom, substantially as described.

15. An incubator comprising a casing having a horizontally disposed heated chamber arranged longitudinally thereof, and a longitudinally disposed hatching chamber arranged above the heated chamber, said casing at its rear end provided with a vertical duct from the upper portion of the heated chamber to the upper portion of the rear end of the hatching chamber, the hatching chamber at its front end provided with a heated air outlet, a heating drum arranged longitudinally within the heated chamber and projecting therefrom at the front end of the casing, said heated chamber having a fresh air inlet at its front end, the projecting front end of said drum adapted to

receive the heated products of a heating lamp and provided with a vertical discharge, said front end of the heated chamber having a direct discharge passage to the exterior thereof, and thermostatic controlled means normally closing said discharge.

16. An incubator having a hatching chamber, heating means, and a removable water tank heated by said means and having top openings into the hatching chamber and provided with means for varying the dimensions of said openings to vary the amount of vapor discharged into the hatching chamber.

17. An incubator having a heated chamber having an air inlet, a hatching chamber, having an air outlet, flues for passing heated air from the heated chamber into the hatching chamber and a removable water tank forming the division or partition between said chambers and open into said hatching chamber.

18. An incubator having a hatching chamber, a heated chamber, a heating flue arranged longitudinally and removably in the heated chamber and projecting to the exterior thereof to receive a heating lamp, and means within the heated chamber removably supporting said flue within said chamber.

19. An incubator having a casing with a heated chamber and a hatching chamber, the heated chamber having an air inlet and the hatching chamber an air outlet, means for passing heated air from the heated chamber into the hatching chamber, means for heating air in the heated chamber, and temperature controlling means embodying a normally closed direct outlet from the heated chamber to the exterior of the casing, and a normally closed direct outlet for reducing the temperature of said air heating means and a thermostatic regulator for simultaneously opening and closing said outlets.

20. An incubator comprising a casing having a hatching chamber and a heated chamber, the bottom floor of the casing forming the bottom of the heated chamber, means above said floor for heating the air in said heated chamber, means for distributing the heated air in the heated chamber to the hatching chamber, and an auxiliary brooder arranged below said casing and comprising an open top box supported from the casing and closed at the top by said floor thereof, substantially as described.

21. An incubator comprising a casing having a hatching chamber and a heated chamber, means for maintaining a circulation of heated air from the heated chamber to and through the hatching chamber, and means for heating air in said heated chamber comprising elongated main and return heating flues arranged longitudinally within said heated chamber and closed from communication therewith, s
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13. Chicken culture apparatus having, a chamber to be heated, heating flues therein comprising a main flue and a return flue having a discharge at its outer end, said flues communicating at their inner ends to carry the heated products throughout the lengths thereof, said main flue adapted to receive at its outer end the heated products of a heating lamp and having a direct vertical discharge pipe opening through the top wall of its outer end, a direct air outlet pipe from said chamber having its upper outlet end arranged within the upper outlet end of said discharge pipe, a single damper normally closing the upper ends of said two pipes, and thermostat actuating means for moving said damper to open said pipes.

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15. An incubator comprising a casing having a horizontally disposed heated chamber arranged longitudinally thereof, and a longitudinally disposed hatching chamber arranged above the heated chamber, said casing at its rear end provided with a vertical duct from the upper portion of the heated chamber to the upper portion of the rear end of the hatching chamber, the hatching chamber at its front end provided with a heated air outlet, a heating drum arranged longitudinally within the heated chamber and projecting therefrom at the front end of the casing, said heated chamber having a fresh air inlet at its front end, the projecting front end of said drum adapted to

receive the heated products of a heating lamp and provided with a vertical discharge, said front end of the heated chamber having a direct discharge passage to the exterior thereof, and thermostatic controlled means normally closing said discharge.

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21. An incubator comprising a casing having a hatching chamber and a heated chamber, means for maintaining a circulation of heated air from the heated chamber to and through the hatching chamber, and means for heating air in said heated chamber comprising elongated main and return heating flues arranged longitudinally within said heated chamber and closed from communication therewith, a heating lamp to discharge its products into the inlet end of said main flue, said return flue at its inlet end receiving said products from the outlet end of the main flue and at its outlet end having a vertical discharge above the plane of and adjacent to said lamp, and subject to the heat radiated therefrom, for the purposes substantially as set forth.

22. Chicken culture apparatus comprising a casing having an air heated chamber, means to maintain a circulation of air therethrough and therefrom, and means for heating air in said chamber comprising elongated main and return heating flues arranged therein, and means to discharge heated products into the receiving end of the main flue, said return flue at its receiving end opening into and receiving said products from the outlet end of the main flue and at its outlet end having a vertical discharge chimney above the receiving end of and closely adjacent to said main flue and said means and subject to the heat thereof to cause acceleration of vertical flow of air and products through said chimney, substantially as described.

23. An incubator comprising a casing having a heated chamber with a fresh air inlet and a hatching chamber, a heating drum arranged in said heated chamber for heating the air therein, means for passing heated air from the heated chamber to the hatching chamber, a heating lamp adapted to discharge its products into said drum, a vertical discharge chimney from said drum, and an air discharge pipe from said hatching chamber into said discharge chimney.

24. An incubator comprising a casing having a hatching chamber and a heated chamber, means for heating said chamber comprising a heating flue arranged therein and projecting at one end thereof at the exterior of the casing and having a discharge, said flue at its projecting end adapted to receive the heated products of a heating lamp and at said end having a direct discharge adapted to reduce the temperature of the flue by directly discharging said products without passing the same through the flue within said heated chamber, means for passing heated air from the heated chamber to the hatching chamber and for permitting circulation of air through said chambers, a heated air direct discharge from the heated chamber to the exterior thereof, and thermostatic controlled means for opening and closing said direct discharge from the flue and said direct discharge from the heated chamber, substantially as described.

25. In chicken culture apparatus, a casing having a chamber to be heated, and heating means therefor comprising a flue arranged in said chamber and at its inlet end adapted to receive the heated products from a lamp, a return flue at its inlet end receiving the

heated products from the outlet end of said flue and at its outlet end having a vertical discharge chimney, and a vertical pipe arranged within said discharge chimney and normally closed at its upper end and at its lower end opening into the inlet end of said flue, substantially as described.

26. In chicken culture apparatus, a casing having a chamber to be heated, heating means therefor comprising a flue arranged longitudinally within said chamber and at its inlet end adapted to receive the heated products from a lamp, a return flue arranged longitudinally within said chamber and at its inlet end receiving said products from the outlet end of said flue, a vertical discharge chimney mounted on and rising from the inlet end of said flue, said return flue at its outlet end discharging into said chimney, said chimney being closed at its lower end from the inlet end of said flue.

27. In chicken culture apparatus, a chamber to be heated, heating means therefor comprising a flue arranged therein, and at its inlet end adapted to receive heated products, a return flue receiving the heated products from the outlet end of said flue, a vertical discharge chimney open at the upper end and receiving the heated products from the outlet end of said return flue, and a direct air discharge pipe from the interior of said chamber having a vertical discharge end arranged within said chimney and normally closed at the top.

28. An incubator comprising a casing having a heated chamber and a hatching chamber, a flue arranged in the heated chamber for heating the air therein and having its receiving end at the exterior of the casing and adapted to receive the heated products of a heating lamp and having a vertical discharge at the exterior of the casing, means for permitting circulation of air into and through the heated chamber and therefrom into and through the hatching chamber comprising an air discharge duct from the hatching chamber into said discharge, a direct normally closed discharge from the receiving end of said heating flue, a direct discharge from the heated chamber to the exterior thereof, and thermostatic means for opening and closing said direct discharge from the flue and said direct discharge from the heated chamber.

In testimony whereof I affix my signature, in presence of two witnesses.

VIRGIL C. KOONS.

Witnesses:
J. C. SPICER,
B. B. IRELAND.

852 (Defendants' Exhibit P, Letters Patent N
J. H. Klinke, February 15, 1910.)

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In testimony whereof I affix my signature, in presence of two witnesses.

VIRGIL C. KOONS.

Witnesses:
J. C. SPICER,
B. B. IRELAND.

852 (Defendants' Exhibit P, Letters Patent No. 949,653 to J. H. Klinke, February 15, 1910.)

706

J. H. KLINKE.

INCUBATOR.

APPLICATION FILED JAN. 21, 1908.

949,653.

Patented Feb. 15, 1910.

2 SHEETS—SHEET 2.

FIG. 3

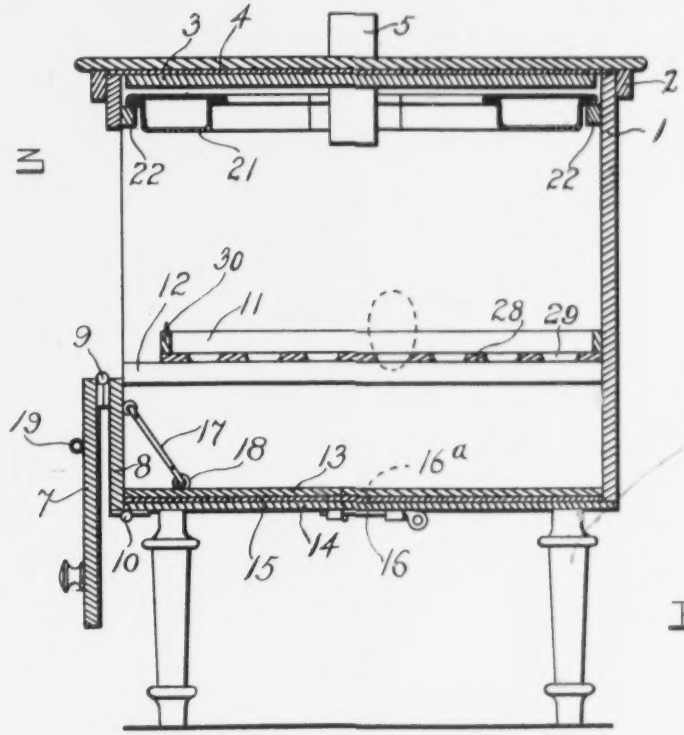
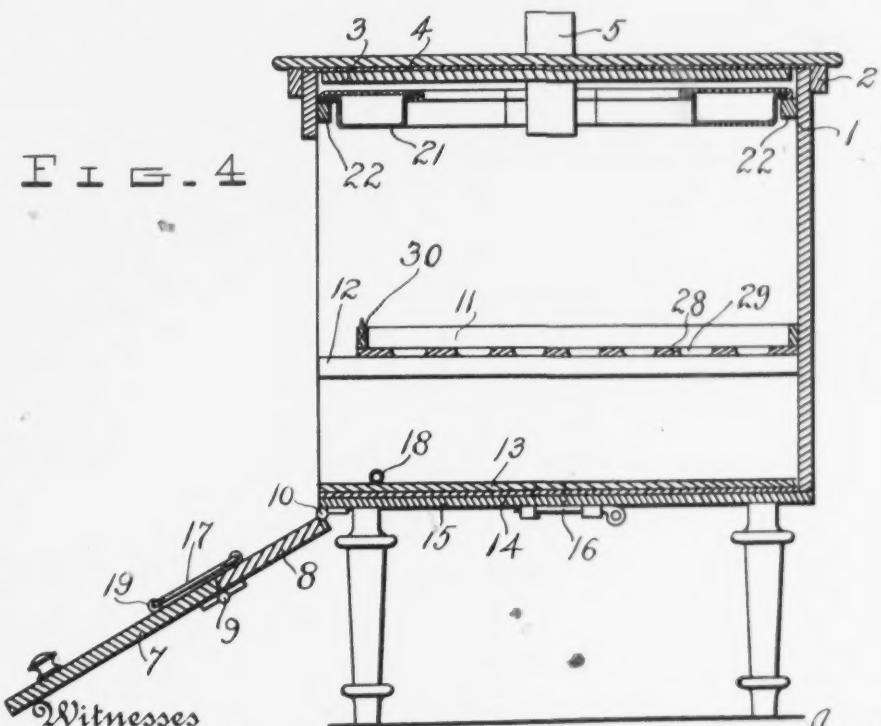


FIG. 5

FIG. 4



Witnesses

B. J. Crawford.

Edwin Guthrie.

Inventor

Joseph H. Klinke.

By James H. Spalding.

Attorney

708

J. H. KLINKE.

INCUBATOR.

APPLICATION FILED JAN. 21, 1908.

949,653.

Patented Feb. 15, 1910.

2 SHEETS—SHEET 1.

FIG. 1

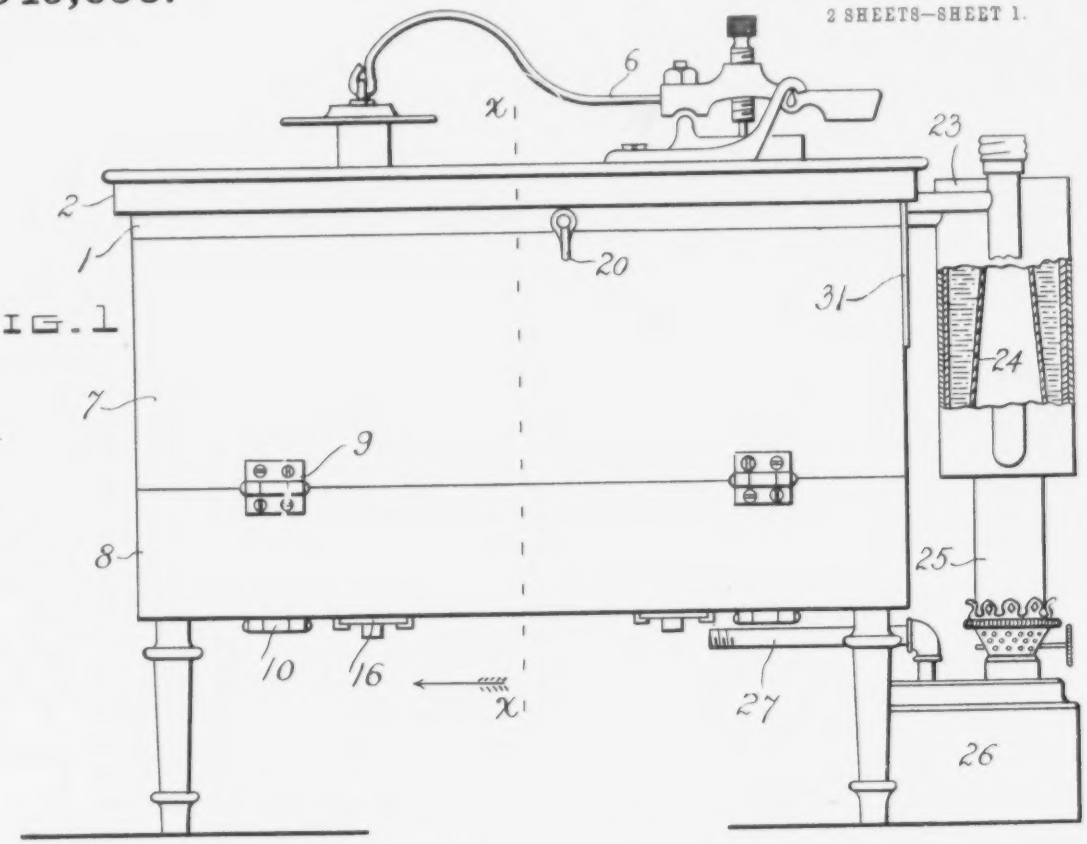
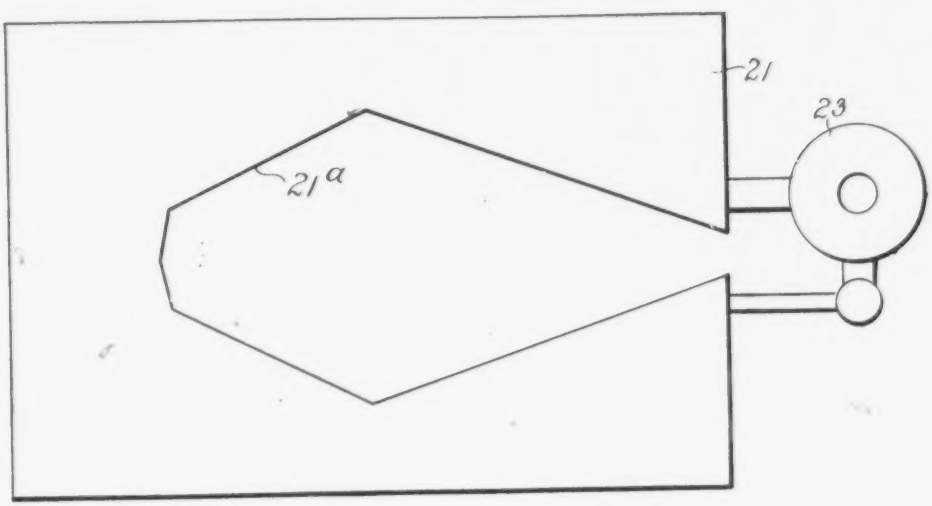


FIG. 2



Witnesses
Ed Crawford
Edwin Guthrie

Inventor
Joseph H. Klinke.
By James H. Spalding.
Attorney

UNITED STATES PATENT

JOSEPH H. KLINKE, OF BRIGHTON, ILLINO

INCUBATOR.

949,653. Specification of Letters Patent. Pat

Application filed January 21, 1908. Serial No. 411,9

To all whom it may concern:

Be it known that I, JOSEPH H. KLINKE, citizen of the United States, residing at Brighton, in the county of Macoupin and State of Illinois, have invented certain new and useful Improvements in Incubators, of which the following is a specification.

My invention relates to incubators, and has for its object the production of a device for hatching chickens having special construction and arrangement of parts, whereby it is believed that the hatching operation may be more conveniently and economically carried out, with less consumption of fuel, and with better control of the heat, also with superior distribution of the heat, than in such devices now on the market with which I am familiar.

The special construction and arrangement constituting this invention is set forth in the accompanying drawings, of which—

Figure 1 represents a side view of the whole. Fig. 2 is a top plan view of the hot water heating tank. Fig. 3 is a cross-section on line *x*—*x* of Fig. 1 showing the upper division of the front door open, and the lower division closed. Fig. 4 is also a cross-section on line *x*—*x* of Fig. 1 showing the two divisions of the front door secured together and in their open position. Fig. 5 represents one of the hooks employed to secure and connect the divisions of the front door.

Like numerals are used to designate like parts throughout the specification and drawings.

The casing 1 has a removable top 2, which has an inner board 3, and between the top and the board 3 is arranged a sheet of asbestos or the like 4, to retain heat. Hot air escapes from the casing by way of the pipe 5 through the top 2, and the outlet is governed by any chosen damper or cover and operating mechanism 6.

The front of the casing has an opening closed by a door comprising two divisions. The uppermost and larger division is marked 7 and the lower division is referred to by the numeral 8. The two divisions are pivotally connected by hinges 9, and the lower division is in like manner secured to casing 1 by hinges 10.

The egg tray is marked 11. It slides in and out upon guiding supports 12, and, there will be noted an interval between the front edge of the tray and the front of the casing. In other words, the tray is not quite so wide as the interior of th of the interior cont closed by the upper door. Below the eg chamber wherein th are suitably protect posure to varying te of the casing consist the sheet of asbestos 15. It is my practice per 16, or more than tures 16ª through the admit fresh air in q varying conditions.

When the lower di occupies the position is secured by the en 17 with the eyes 18 i When, however, it is tire front and have front door act as caused to engage the in Fig. 4. The fron closed position by t Fig. 1.

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The egg tray 11, h vided with holes 29 to sition indicated, and t slide in and out on t as described. In Fig noted that the front 3 a little distance back 12 leaving a space b

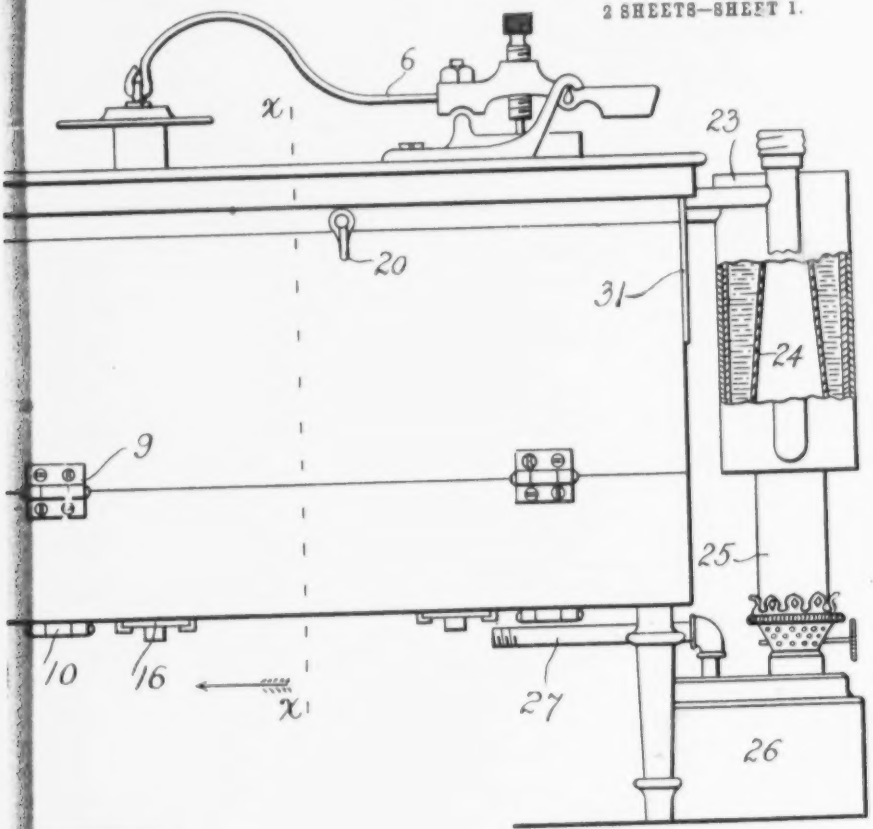
J. H. KLINKE.

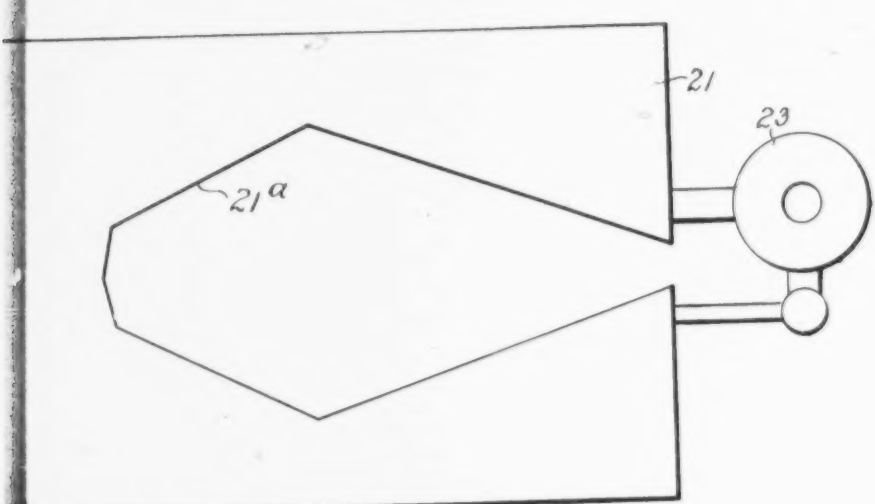
INCUBATOR.

APPLICATION FILED JAN. 21, 1908.

Patented Feb. 15, 1910.

2 SHEETS—SHEET 1.





Inventor

Joseph H. Klinke.

By James H. Spalding.

Attorney

Price

UNITED STATES PATENT OFFICE.

JOSEPH H. KLINKE, OF BRIGHTON, ILLINOIS.

INCUBATOR.

949,653. Specification of Letters Patent. Patented Feb. 15, 1910.

Application filed January 21, 1908. Serial No. 411,837.

To all whom it may concern:

Be it known that I, JOSEPH H. KLINKE, citizen of the United States, residing at Brighton, in the county of Macoupin and State of Illinois, have invented certain new and useful Improvements in Incubators, of which the following is a specification.

My invention relates to incubators, and has for its object the production of a device for hatching chickens having special construction and arrangement of parts, whereby it is believed that the hatching operation may be more conveniently and economically carried out, with less consumption of fuel, and with better control of the heat, also with superior distribution of the heat, than in such devices now on the market with which I am familiar.

The special construction and arrangement constituting this invention is set forth in the accompanying drawings, of which—

Figure 1 represents a side view of the whole. Fig. 2 is a top plan view of the hot water heating tank. Fig. 3 is a cross-section on line *x*—*x* of Fig. 1 showing the upper division of the front door open, and the lower division closed. Fig. 4 is also a cross-section on line *x*—*x* of Fig. 1 showing the two divisions of the front door secured together and in their open position. Fig. 5 represents one of the hooks employed to secure and connect the divisions of the front door.

Like numerals are used to designate like parts throughout the specification and drawings.

The casing 1 has a removable top 2, which has an inner board 3, and between the top and the board 3 is arranged a sheet of asbestos or the like 4, to retain heat. Hot air escapes from the casing by way of the pipe 5 through the top 2, and the outlet is governed by any chosen damper or cover and operating mechanism 6.

The front of the casing has an opening closed by a door comprising two divisions. The uppermost and larger division is marked 7 and the lower division is referred to by the numeral 8. The two divisions are pivotally connected by hinges 9, and the lower division is in like manner secured to casing 1 by hinges 10.

The egg tray is marked 11. It slides in and out upon guiding supports 12, and, there will be noted an interval between the front edge of the tray and the front of the casing. In other words, the tray is not quite so wide as the interior of the casing. That portion of the interior containing the egg tray is closed by the upper division 7 of the front door. Below the egg tray is the hover or chamber wherein the newly hatched chicks are suitably protected against sudden exposure to varying temperature. The bottom of the casing consists of the inner board 13, the sheet of asbestos 14, and the outer board 15. It is my practice to provide a slide damper 16, or more than one, that governs apertures 16^a through the bottom of the casing to admit fresh air in quantities desired under varying conditions.

When the lower division of the front door occupies the position illustrated in Fig. 3, it is secured by the engagement of the hooks 17 with the eyes 18 in the floor of the hover. When, however, it is desired to open the entire front and have the two divisions of the front door act as one, the hooks 17 are caused to engage the eyes 19, as illustrated in Fig. 4. The front door is secured in its closed position by the button 20 shown in Fig. 1.

The form of the hot water tank 21 is best shown in Fig. 2, as the kite-shaped opening 21^a therein is an important feature of my invention, experience having shown the particular shape of the opening to have an important bearing upon the desired distribution of heat from the tank, whereby even temperature throughout is attained without delay and constantly maintained. The opening 21^a is narrower at the ends and wider between the ends, thereby locating the greater bodies of hot water at the corners of the egg chamber, thus creating a greater volume of heat at the corners. The tank is supported upon the cleats 22. Connected with the tank is the heater 23, having the tapering interior 24 directly heated by the products of combustion arising through the chimney 25 from lamp 26. I have provided the body or bowl of the lamp with a pipe 27, which is used whenever it is desired to connect the lamp with a source of oil.

The egg tray 11, has its bottom 28 provided with holes 29 to hold the eggs in the position indicated, and the tray is arranged to slide in and out on the supporting rails 12 as described. In Figs. 3 and 4 it will be noted that the front 30 of the tray is located a little distance back of the end of the rail 12 leaving a space by way of which the

lower chamber is ventilated. It will be observed also that the tray slides out above the lower part 8 of the front door when that part is closed, and it is not necessary to lower the division 8 of the door and thus open the lower chamber in front and perhaps cool it too suddenly or too much.

It is desirable as a protection against the heat from the heater 23 to attach a metal plate 31 to the outside of the casing adjacent to the heater as shown.

In operating my invention, the egg tray may be easily reached by letting down the division 7 of the front door, during which time the chamber below the tray, closed by the division 8 of the front door, is kept closed and no material change in its temperature takes place.

Having now described my invention, and explained the mode of its operation, what I claim is—

1. In an incubator, the combination with the casing having a front opening, of a front door arranged to close the said opening and comprising two divisions pivotally secured to each other, the lower division being also pivotally secured to the casing, means for securing the said upper division in its closed position, and detachable engaging devices comprising a member connected with the said casing and a like member connected with the upper division of said front door, said devices comprising also a movable member connected with the lower division of said front door and adapted to be engaged with either of the two said like members whereby the said lower division may be held closed or said upper and lower divisions secured together and movable as one, substantially as described.

2. In an incubator, the combination with the casing having a front opening, of a front door arranged to close the said opening and comprising two divisions pivotally secured to each other, the lower division being also pivotally secured to the casing, an egg tray having less width than the interior of the said casing, the said tray being removable and arranged to slide in and out above the upper edge of the said lower division of the front door, means for securing the said upper division in its closed position, and detachable engaging devices comprising a member connected with the said casing and a like member connected with the upper division of said front door, said devices comprising also a movable member connected with the lower division of said front door and adapted to be engaged with either of the two said like members whereby the said lower division may be held closed or said upper and lower divisions secured together and movable as one, substantially as described.

3. In an incubator, the combination with the casing having a front opening, of a front door arranged to close the said opening and comprising two divisions pivotally secured to each other, the lower division being also pivotally secured to the casing, an egg tray, the said tray being removable and arranged to slide in and out above the upper edge of the said lower division of the front door, means for securing the said upper division in its closed position, and detachable engaging devices comprising a member connected with the said casing and a like member connected with the upper division of said front door, said devices comprising also a movable member connected with the lower division of said front door and adapted to be engaged with either of the two said like members whereby the said lower division may be held closed or said upper and lower divisions secured together and movable as one, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOSEPH H. KLINKE.

Witnesses:
FRANK W. LAUCK,
ARNOLD A. BOTT.

858 (Defendants' Exhibit P, Letters Patent No. to J. O. Olson, June 16, 1914.)

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3. In an incubator, the combination with the casing having a front opening, of a front door arranged to close the said opening and comprising two divisions pivotally secured to each other, the lower division being also pivotally secured to the casing, an egg tray, the said tray being removable and arranged to slide in and out above the upper edge of the said lower division of the front door, means for securing the said upper division in its closed position, and detachable engaging devices comprising a member connected with the said casing and a like member connected with the upper division of said front door, said devices comprising also a movable member connected with the lower division of said front door and adapted to be engaged with either of the two said like members whereby the said lower division may be held closed or said upper and lower divisions secured together and movable as one, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOSEPH H. KLINKE.

Witnesses:
FRANK W. LAUCK,
ARNOLD A. BOTT.

858 (Defendants' Exhibit P, Letters Patent No. 1,100,146 to J. O. Olson, June 16, 1914.)

712

J. O. OLSON.

INCUBATOR.

APPLICATION FILED MAR. 27, 1912.

1,100,146.

Patented June 16, 1914.

Fig. 1.

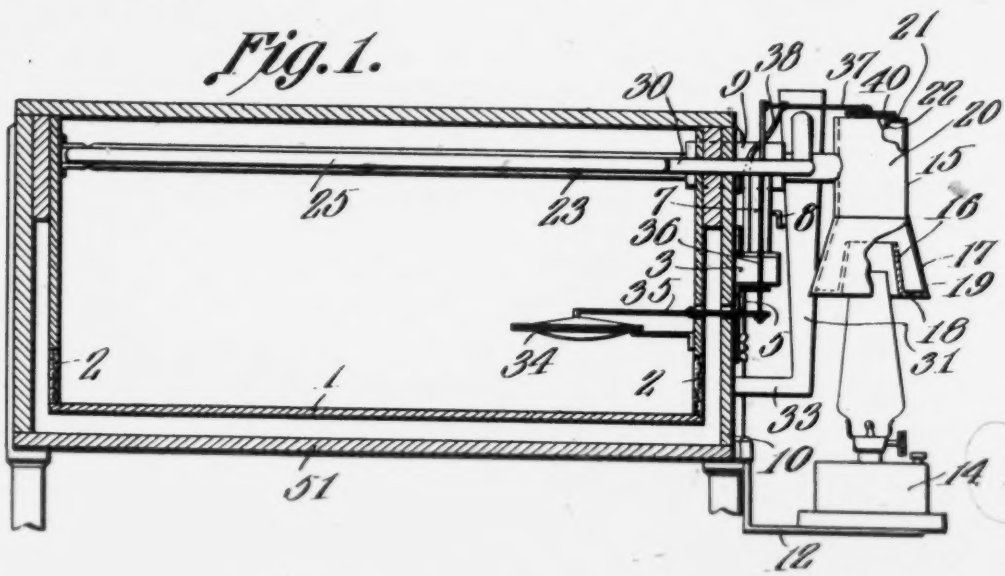


Fig. 2.

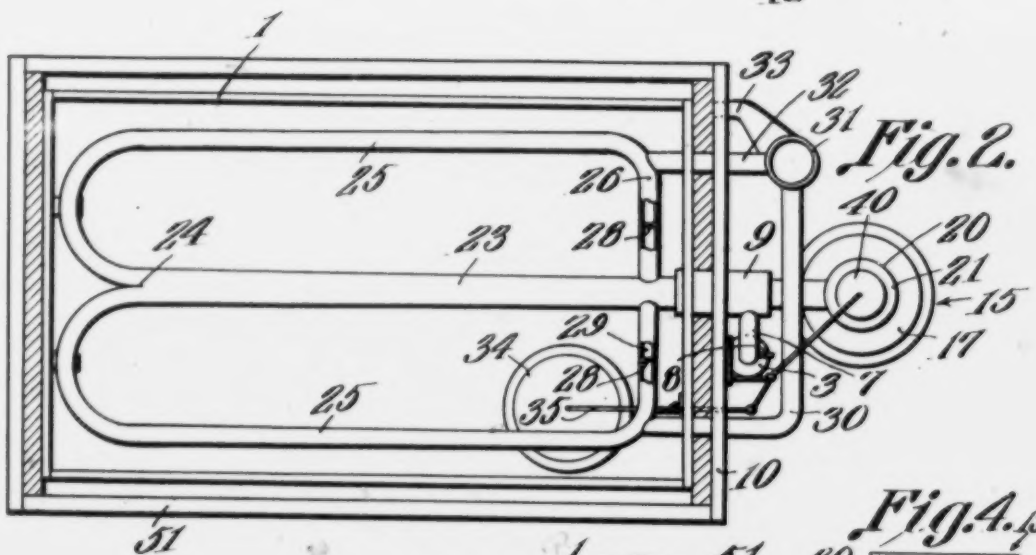


Fig. 3.

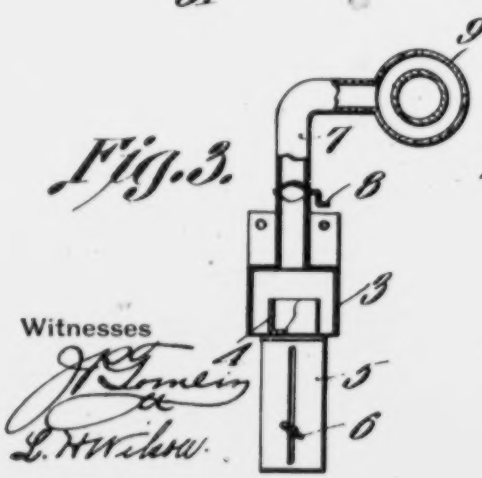
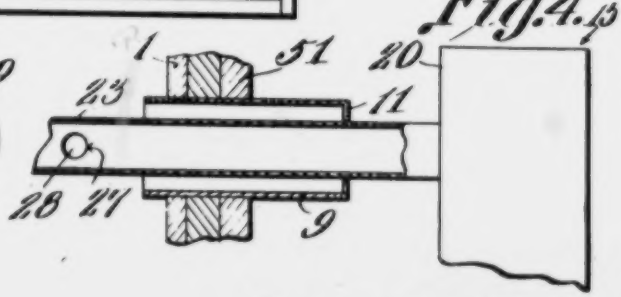


Fig. 4.



Witnesses

J. T. Tomein

L. H. Wilson

John O. Olson,
Inventor

by C. A. Snow & Co.
Attorneys

UNITED STATES PATENT

JOHN O. OLSON, OF RED WING, MINNESOTA.

INCUBATOR.

1,100,146. Specification of Letters Patent. Paten

Application filed March 27, 1912. Serial No. 686,607.

To all whom it may concern:

Be it known that I, JOHN O. OLSON, a citizen of the United States, residing at Red Wing, in the county of Goodhue and State of Minnesota, have invented a new and useful Incubator, of which the following is a specification.

The object of this invention is to provide a novel form of moistening device, and, specifically, to provide means whereby the capacity of a moistening chamber may be regulated and adjusted.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

In the accompanying drawings—Figure 1 shows the invention in vertical longitudinal section, parts appearing in elevation; Fig. 2 is a top plan, the lid of the outer case being removed; Fig. 3 is a sectional detail of the moistening mechanism and attending parts; and Fig. 4 is a fragmental vertical section showing the means whereby the sections of the pipes are assembled with the cases.

In carrying out the invention there is provided an inner case 1, having outlets 2, securing a ventilation of the case. The case 1 is surrounded by an outer case 51. To one end 10 of the outer case 51 is secured a hood 3, within which is supported a water cup 4, in any desired manner. In the present instance, the water cup 4 is upheld by an angle bracket 5, adjustably secured to the end wall 10 of the case 51 by means of a clamp and slot connection 6, permitting a lowering of the bracket 5, so that the cup 4 may be inserted into and be removed from the hood 3. The upper end of the hood 3 is closed, and is entered by an air supply pipe 7, provided with a damper 8. A tubular sleeve 9 is inserted through the end walls of the cases 1 and 51, the outer end of the sleeve 9 being closed as shown at 11. The air supply pipe 7 enters one side of the sleeve 9.

Supported by a bracket 12 is a lamp 14, the chimney of which enters a heating drum, denoted generally by the numeral 15. The

and an outer wall 17, 18 in which there are The upper end of the nected with the cylin the drum, the same h vided with a draft out

A hot air delivery p of the cylindrical por and passes inwardly 11 of the sleeve 9, the ing an indraft of air pipe and the sleeve. extends along the long case 1, substantially t case, the pipe 23 diver to form a pair of retur turn bends 25 termina which enter the delive its initial end, as indi the interior of the port bends, imperforate par partitions being located pipe 23 and the extrem return bends 25. Thus the portions 26 of the r chambers 29 which co delivery pipe 23 adjac

The portions 30 an bends enter an uprigh 31, the wider end of wh posed, the narrower, lo pipe entering the case ing with the space betw 1 as shown at 33.

Located within the ca 34, operatively connect fulcrumed intermediate wall of the inner case an the end wall of the out end of the lever 35 is with a connection 36, co end to the lever 37, suppo 38, the free end of the a damper 40, positioned 22 in the top of the drum

In practical operation heat the drum 15 and drawn inwardly and up openings 19 in the botto air being heated by con face of the inner wall 1 15, the heated air will pipe 23, and traverse th thereof, the heated air p tremities 30 and 30 of th

J. O. OLSON.

INCUBATOR.

APPLICATION FILED MAR. 27, 1912.

Patented June 16, 1914.

Fig. 1.

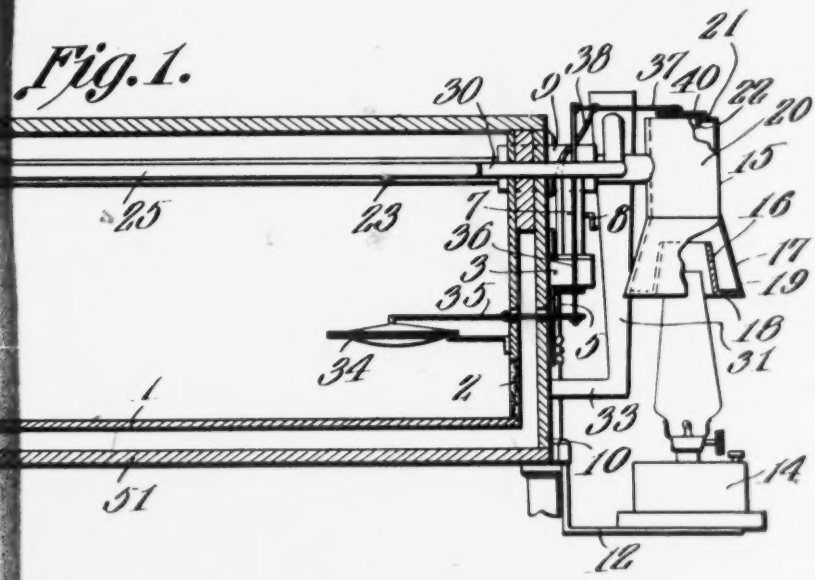


Fig. 2.

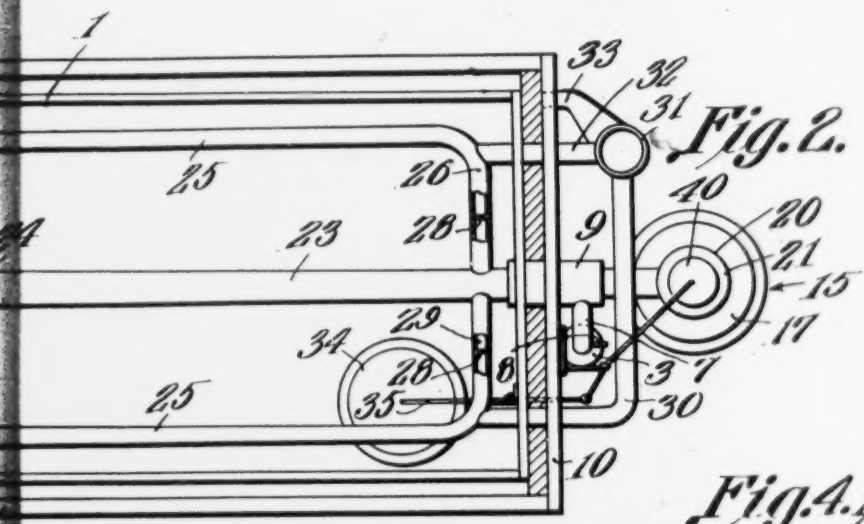
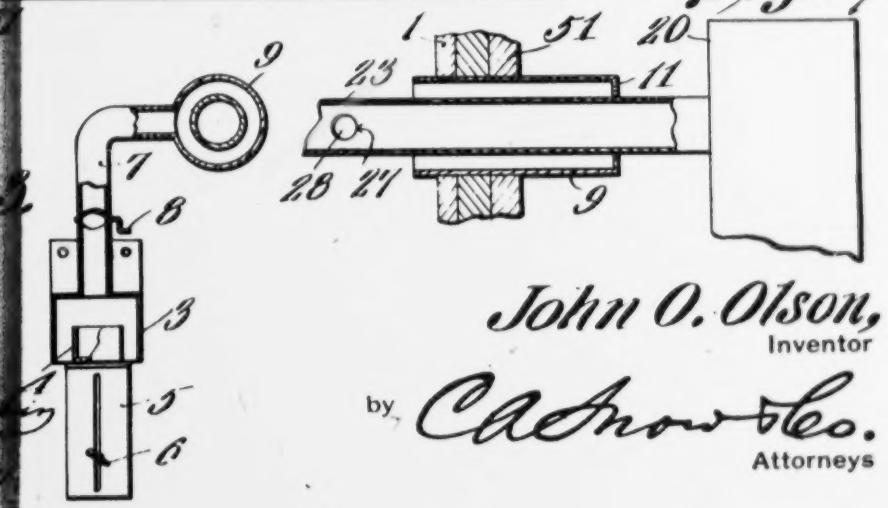


Fig. 4.



John O. Olson,
Inventor

by C. A. Snow & Co.
Attorneys

UNITED STATES PATENT OFFICE.

JOHN O. OLSON, OF RED WING, MINNESOTA.

INCUBATOR.

1,100,146. Specification of Letters Patent. Patented June 16, 1914.

Application filed March 27, 1912. Serial No. 686,607.

To all whom it may concern:

Be it known that I, JOHN O. OLSON, a citizen of the United States, residing at Red Wing, in the county of Goodhue and State of Minnesota, have invented a new and useful Incubator, of which the following is a specification.

The object of this invention is to provide a novel form of moistening device, and, specifically, to provide means whereby the capacity of a moistening chamber may be regulated and adjusted.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

In the accompanying drawings—Figure 1 shows the invention in vertical longitudinal section, parts appearing in elevation; Fig. 2 is a top plan, the lid of the outer case being removed; Fig. 3 is a sectional detail of the moistening mechanism and attending parts; and Fig. 4 is a fragmental vertical section showing the means whereby the sections of the pipes are assembled with the cases.

In carrying out the invention there is provided an inner case 1, having outlets 2, securing a ventilation of the case. The case 1 is surrounded by an outer case 51. To one end 10 of the outer case 51 is secured a hood 3, within which is supported a water cup 4, in any desired manner. In the present instance, the water cup 4 is upheld by an angle bracket 5, adjustably secured to the end wall 10 of the case 51 by means of a clamp and slot connection 6, permitting a lowering of the bracket 5, so that the cup 4 may be inserted into and be removed from the hood 3. The upper end of the hood 3 is closed, and is entered by an air supply pipe 7, provided with a damper 8. A tubular sleeve 9 is inserted through the end walls of the cases 1 and 51, the outer end of the sleeve 9 being closed as shown at 11. The air supply pipe 7 enters one side of the sleeve 9.

Supported by a bracket 12 is a lamp 14, the chimney of which enters a heating drum, denoted generally by the numeral 15. The heating drum 15 includes an inner wall 16 and an outer wall 17, connected by a bottom 18 in which there are air inlet openings 19. The upper end of the outer wall 17 is connected with the cylindrical portion 20 of the drum, the same having a top 21, provided with a draft outlet opening 22.

A hot air delivery pipe 23 enters one side of the cylindrical portion 20 of the drum, and passes inwardly through the end wall 11 of the sleeve 9, the end wall 11 preventing an indraft of air between the delivery pipe and the sleeve. The delivery pipe 23 extends along the longitudinal center of the case 1, substantially the full length of the case, the pipe 23 diverging, as shown at 24, to form a pair of return bends 25. The return bends 25 terminate in connections 26 which enter the delivery pipe 23, adjacent its initial end, as indicated at 27. Across the interior of the portions 26 of the return bends, imperforate partitions 28 extend, the partitions being located between the delivery pipe 23 and the extremities 30 and 32 of the return bends 25. Thus there are formed in the portions 26 of the return bends, heating chambers 29 which communicate with the delivery pipe 23 adjacent its initial end.

The portions 30 and 32 of the return bends enter an upright tapered vent pipe 31, the wider end of which is upwardly disposed, the narrower, lower end of the vent pipe entering the case 51 and communicating with the space between the cases 51 and 1 as shown at 33.

Located within the case 1 is a thermostat 34, operatively connected with a lever 35, fulcrumed intermediate its ends in the end wall of the inner case and extending through the end wall of the outer case. The outer end of the lever 35 is operatively united with a connection 36, connected at its upper end to the lever 37, supported upon a bracket 38, the free end of the lever 37 supporting a damper 40, positioned above the opening 22 in the top of the drum 15.

In practical operation, the lamp 14 will heat the drum 15 and cause the air to be drawn inwardly and upwardly through the openings 19 in the bottom of the drum, the air being heated by contact with the outer face of the inner wall 16. From the drum 15, the heated air will enter the delivery pipe 23, and traverse the return bends 25 thereof, the heated air passing into the extremities 30 and 32 of the return bends, and thus entering the vent pipe 31. The heated

air entering the vent pipe 31 will traverse the same, causing a draft in the vent pipe, and creating a suction through the portion 33 of the vent pipe, whereby the foul air between the cases 1 and 51 will be withdrawn, the outlets 2 furnishing further communication with the interior of the case 1.

As the air traverses the delivery pipe 23, the temperature within the chambers 29 will be raised, causing a heating of the partitions 28, and causing a heating of the air which lies between the partitions and the portions 30 and 32 of the return bends. Therefore, the air as it passes from the return bends 25, into the portions 30 and 32 of the return bends, will be heated to some extent, before it enters the vent pipe 31. Since the air is thus heated, prior to entering the vent pipe 31, the draft through the vent pipe will be increased accordingly.

When the air within the case 1 is drawn outwardly through the openings 2 and beneath the case 1 through the vent pipe 31, in the manner hereinbefore described, fresh air will be drawn upwardly through the hood 3, about the water cup 4, the entering air being thus moistened. The air entering the hood 3 will traverse the pipe supply 7, controlled by the damper 8, and enter the sleeve 9, the outer end of which is closed. As the air enters the sleeve 9 it will come into contact with the initial end of the delivery pipe 23 and be heated, a supply of moist, fresh, heated air thus passing into the casing 1, through the open inner end of the sleeve 9.

The function of the thermostat 34 and the parts controlled thereby is common and well understood and needs no specific explanation.

Broadly considered, the present invention comprises, as shown in Fig. 3, an air supply pipe 7 which is open at one end to define a moistening chamber represented by the hood 3. A moistening device represented by the cup 4 is located in the chamber 3, and a support 5 for the cup is provided, the support being movable to shift the position of the cup in the chamber 3, thereby to vary the capacity of the chamber.

Having thus described the invention, what is claimed is:—

In a device of the class described, an air supply pipe open at one end to define a moistening chamber; a moistening device in the chamber; and a support for the moistening device, the support being movable to shift the position of the moistening device in the chamber thereby to vary the capacity of the chamber.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JOHN O. OLSON.

Witnesses:
CHAS. M. ANDERSON,
THOS. MOHN.

862 (Defendants' Exhibit P, Letters Patent No. 1
to G. E. Goldstein, May 4, 1915.)

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In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JOHN O. OLSON.

Witnesses:
CHAS. M. ANDERSON,
THOS. MOHN.

862 (Defendants' Exhibit P, Letters Patent No. 1,137,752 to G. E. Goldstein, May 4, 1915.)

716

G. E. GOLDSTEIN.

APPARATUS FOR CURING OR ARTIFICIALLY AGING CIGARS.

APPLICATION FILED JUNE 20, 1914.

1,137,752.

Patented May 4, 1915.

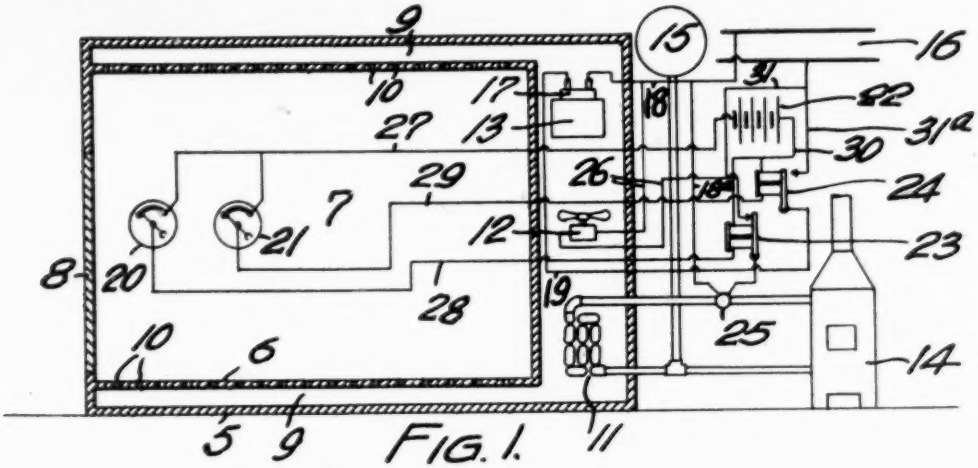

FIG. 1.

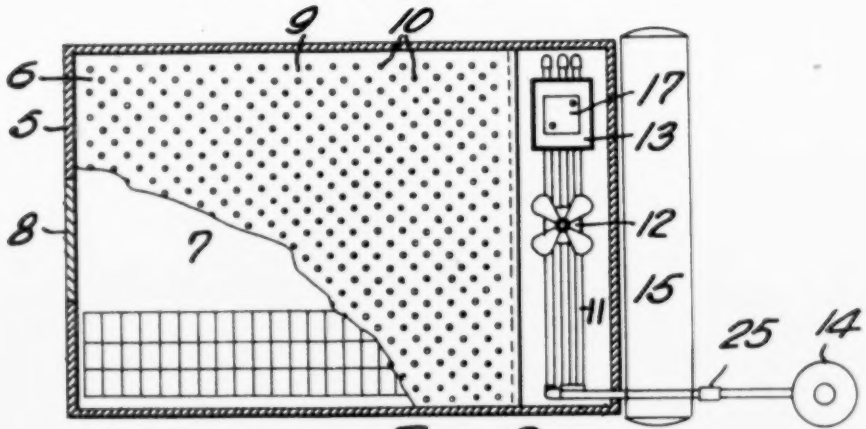

FIG. 2.

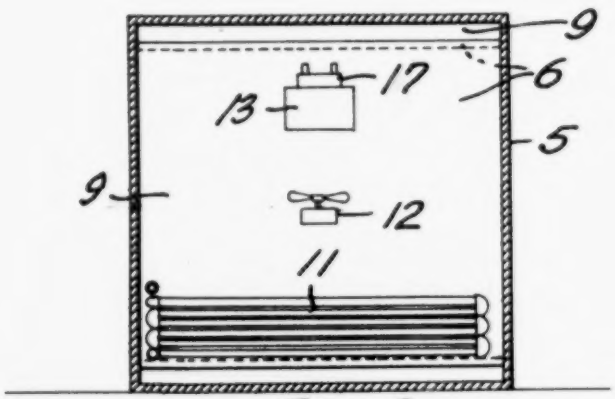

FIG. 3.

Witnesses

S. M. Allen

J. R. Moreland

Inventor

G. E. Goldstein

By Fitzgerald, Brooks & Co

His Attorneys

UNITED STATES PATENT

GEORGE E. GOLDSTEIN, OF MONTREAL, QUEBEC, C.

APPARATUS FOR CURING OR ARTIFICIALLY AGING

1,137,752. Specification of Letters Patent. Pa

Application filed June 20, 1914. Serial No. 846,294.

To all whom it may concern:

Be it known that I, GEORGE E. GOLDSTEIN, of the city of Montreal, in the Province of Quebec and Dominion of Canada, a citizen of the Dominion of Canada, have invented certain new and useful Improvements in Apparatus for Curing or Artificially Aging Cigars, of which the following is a full, clear, and exact description.

This invention relates to improvements in apparatus for curing or artificially aging cigars or other forms of manufactured tobacco, and the object of the invention is to provide an apparatus which will operate automatically to maintain the proper temperature, humidity and circulation of the air coming in contact with the cigars.

The device consists essentially of a double walled chamber within which the cigars are stored. The inner wall is perforated, and air heating, humidifying and circulating means are provided in the space between the inner and outer walls of the chamber, so that the air is drawn from within the inner wall into the space between the inner and outer walls, brought to proper temperature and moisture, and redelivered within the inner wall. An electric thermometer and hygrometer are provided within the inner wall and automatically regulate the humidifying and heating apparatus to maintain as nearly as possible uniform conditions.

In the drawings which illustrate the invention:—Figure 1 is a vertical longitudinal section of the chamber showing the various elements of the apparatus diagrammatically. Fig. 2 is a plan view of the apparatus, the electrical equipment being omitted. Fig. 3 is a rear elevation of the device, the back outer wall being removed.

Referring more particularly to the drawings, 5 designates the outer and 6 the inner wall inclosing a chamber 7 for the storage of cigars. At the front of the chamber, in which is provided a door 8, and at the sides, the inner and outer walls may coincide, but it is essential that at back, top and bottom, a passage 9 be left for the circulation of air. At top and bottom, the inner wall 6 is provided with apertures 10 through which the air passes from the circulation passages into the chamber.

At the rear of the chamber, a heating coil 11, air circulating fan 12 and humidifying tank 13 are provided in the passage 9, as clearly shown in the ing coil is connected t with a feed tank 15 fo maintaining pressure fan 12 is operated p current drawn from humidifying tank 13 heating element 17 drawn from one of t wire 18 and returned through wire 19.

Within the chambe mometer or thermosta hygrometer 21 are pro fixed and a moving mometer and hygrome current from a batter as they make or break operate relay 23 and 2 relay 23 is arranged t circuit of the heater 17 arranged to open and an electrically operated tween the heater 14 and is operated by current to the mains through flows from the battery to both thermometer a from the thermometer the relay 23, and fr through wire 29 to the the relays back to the b 30. Current flows from wires 18 and 18ª to the 25, and returns through the relays and wires 31 a

The operation of the simple. If the humidity limit of variation, the i contact, which energizes relay to draw up its a break the circuit of the the humidity drops belo the battery circuit thr broken and the relay ar ing the heater circuit. rises beyond the set limi battery circuit through t and the armature is dra circuit of the valve 23, w off the supply of heat to the temperature drops s cuit through the relay is b mostat, and when the rela

G. E. GOLDSTEIN.

ATUS FOR CURING OR ARTIFICIALLY AGING CIGARS.

APPLICATION FILED JUNE 20, 1914.

Patented May 4, 1915.

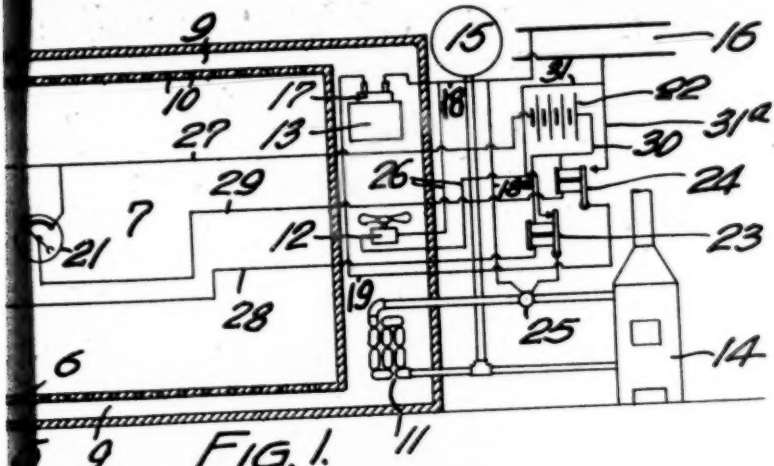

FIG. 1.

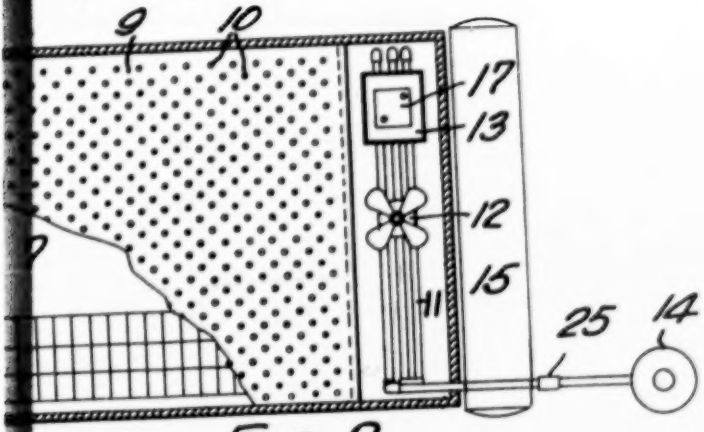

FIG. 2.

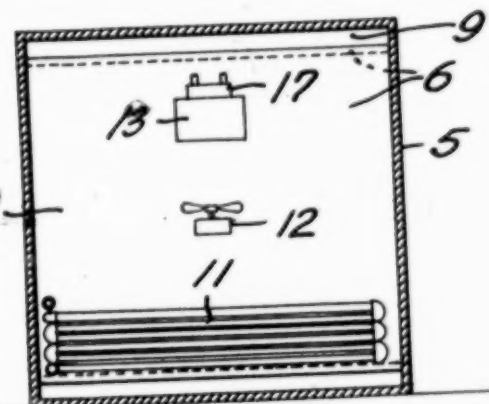

FIG. 3.

Inventor
G. E. Goldstein

By Fitzsimmons & Laughlin Co
His Attorneys

UNITED STATES PATENT OFFICE.

GEORGE E. GOLDSTEIN, OF MONTREAL, QUEBEC, CANADA.

APPARATUS FOR CURING OR ARTIFICIALLY AGING CIGARS.

1,137,752. Specification of Letters Patent. Patented May 4, 1915.

Application filed June 20, 1914. Serial No. 846,294.

To all whom it may concern:

Be it known that I, GEORGE E. GOLDSTEIN, of the city of Montreal, in the Province of Quebec and Dominion of Canada, a citizen of the Dominion of Canada, have invented certain new and useful Improvements in Apparatus for Curing or Artificially Aging Cigars, of which the following is a full, clear, and exact description.

This invention relates to improvements in apparatus for curing or artificially aging cigars or other forms of manufactured tobacco, and the object of the invention is to provide an apparatus which will operate automatically to maintain the proper temperature, humidity and circulation of the air coming in contact with the cigars.

The device consists essentially of a double walled chamber within which the cigars are stored. The inner wall is perforated, and air heating, humidifying and circulating means are provided in the space between the inner and outer walls of the chamber, so that the air is drawn from within the inner wall into the space between the inner and outer walls, brought to proper temperature and moisture, and redelivered within the inner wall. An electric thermometer and hygrometer are provided within the inner wall and automatically regulate the humidifying and heating apparatus to maintain as nearly as possible uniform conditions.

In the drawings which illustrate the invention:—Figure 1 is a vertical longitudinal section of the chamber showing the various elements of the apparatus diagrammatically. Fig. 2 is a plan view of the apparatus, the electrical equipment being omitted. Fig. 3 is a rear elevation of the device, the back outer wall being removed.

Referring more particularly to the drawings, 5 designates the outer and 6 the inner wall inclosing a chamber 7 for the storage of cigars. At the front of the chamber, in which is provided a door 8, and at the sides, the inner and outer walls may coincide, but it is essential that at back, top and bottom, a passage 9 be left for the circulation of air. At top and bottom, the inner wall 6 is provided with apertures 10 through which the air passes from the circulation passages into the chamber.

At the rear of the chamber, a heating coil 11, air circulating fan 12 and humidifying tank 13 are provided in the passage 9, as clearly shown in the drawings. The heating coil is connected to a heater 14 provided with a feed tank 15 for supplying water and maintaining pressure for circulation. The fan 12 is operated preferably by electric current drawn from the mains 16. The humidifying tank 13 contains an electric heating element 17 operated by current drawn from one of the mains 16 through wire 18 and returned to the opposite main through wire 19.

Within the chamber 7, an electric thermometer or thermostat 20 and an electric hygrometer 21 are provided, each having a fixed and a moving contact. The thermometer and hygrometer are electrified by current from a battery 22, and according as they make or break the battery circuits operate relay 23 and 24 respectively. The relay 23 is arranged to open and close the circuit of the heater 17, and the relay 24 is arranged to open and close the circuit of an electrically operated valve 25 located between the heater 14 and coil 11. The fan 12 is operated by current flowing from and to the mains through wires 26. Current flows from the battery through the wire 27 to both thermometer and hygrometer, and from the thermometer through wire 28 to the relay 23, and from the hygrometer through wire 29 to the relay 24, and from the relays back to the battery through wire 30. Current flows from the main 16 through wires 18 and 18^a to the heater 17 and valve 25, and returns through the armatures of the relays and wires 31 and 31^a.

The operation of the device is extremely simple. If the humidity rises above the set limit of variation, the instrument 21 makes contact, which energizes the magnet of the relay to draw up its armature, and thus break the circuit of the heater 17. When the humidity drops below a certain point, the battery circuit through the relay is broken and the relay armature drops, closing the heater circuit. It the temperature rises beyond the set limit of variation, the battery circuit through the relay 23 is made and the armature is drawn up, making the circuit of the valve 23, which closes and cuts off the supply of heat to the coil 11. When the temperature drops sufficiently, the circuit through the relay is broken by the thermostat, and when the relay releases its armature, the valve circuit is opened and the

valve opens, admitting heat to the coil. The fan operates continuously, forcing the warm humid air up and allowing it to enter at the top of the chamber 7, and work downwardly through the cigars, escaping at the bottom into the passage 9 to be again drawn up by the fan through the coil 11 and reheated and rehumidified.

While the invention has been shown in its simplest form, it is obvious that a number of changes may be made in the apparatus as required to meet special conditions. If electricity or fluid fuel are used for the heater 14, the valve 25 will be arranged to control the supply of the heating agent.

Having thus described my invention, what I claim is:—

1. A device of the character described, comprising a double walled chamber having the inner wall thereof formed imperforate at opposite sides, an air heating coil, a water tank, and an air circulating fan located between the inner and outer walls, means for heating and circulating fluid through said coil, a heating apparatus located in the tank, a thermometer and a hygrometer located within the chamber, electrically actuated means controlled by said thermometer governing the circulation of the heating fluid through said coil, and electrically actuated means controlled by the hygrometer governing the operation of the heater in said tank.

2. A device of the character described, comprising a double walled chamber having opposite inner walls thereof formed perforate, a water tank, an air circulating fan and a radiator located between the inner and outer walls, a fluid heating and circulating apparatus connected to said radiator, an electric water heating means within the tank, a thermometer and a hygrometer located within the chamber, means for controlling the temperature and supply of fluid through said radiator, a source of electric energy for said heater, said fan and said controlling means, a battery, a relay in circuit with the battery and thermometer arranged to govern the connection of said heating fluid controlling means with the source of energy, and a second relay in circuit with the battery and hygrometer arranged to govern the connection of said electric water heater with the source of energy.

In witness whereof, I have hereunto set my hand in the presence of two witnesses.

GEORGE E. GOLDSTEIN.

Witnesses:
S. R. W. Allen,
G. M. Moreland.

866 (Defendants' Exhibit P, Letters Patent No
to S. S. Van Keuren, November 16, 1915.)

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means controlled by the hygrometer governing the operation of the heater in said tank.

2. A device of the character described, comprising a double walled chamber having opposite inner walls thereof formed perforate, a water tank, an air circulating fan and a radiator located between the inner and outer walls, a fluid heating and circulating apparatus connected to said radiator, an electric water heating means within the tank, a thermometer and a hygrometer located within the chamber, means for controlling the temperature and supply of fluid through said radiator, a source of electric energy for said heater, said fan and said controlling means, a battery, a relay in circuit with the battery and thermometer arranged to govern the connection of said heating fluid controlling means with the source of energy, and a second relay in circuit with the battery and hygrometer arranged to govern the connection of said electric water heater with the source of energy.

In witness whereof, I have hereunto set my hand in the presence of two witnesses.

GEORGE E. GOLDSTEIN.

Witnesses:
S. R. W. ALLEN,
G. M. MORELAND.

866 (Defendants' Exhibit P, Letters Patent No. 1,160,793 to S. S. Van Keuren, November 16, 1915.)

720

S. S. VAN KEUREN.

INCUBATOR.

APPLICATION FILED JUNE 12, 1915.

1,160,793.

Patented Nov. 16, 1915.

3 SHEETS—SHEET 1.

Fig. 1.

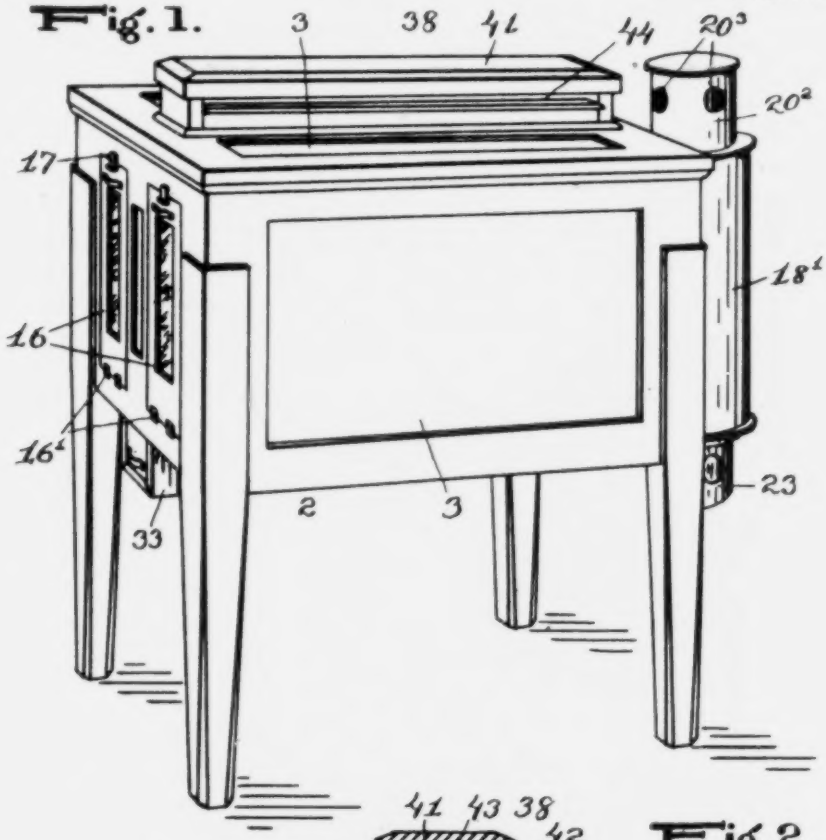
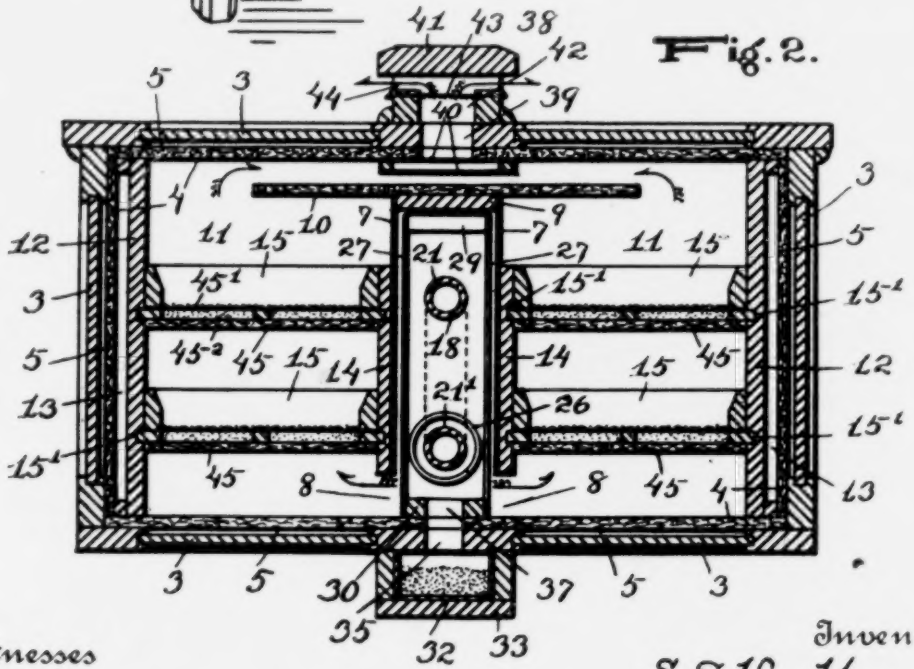


Fig. 2.



Witnesses

Stuart Hilder.

By

Inventor

S. S. Van Keuren

E. W. Anderson & Son

his Attorneys

722

S. S. VAN KEUREN.

INCUBATOR.

APPLICATION FILED JUNE 12, 1915.

1,160,793.

Patented Nov. 16, 1915.

3 SHEETS—SHEET 2.

Fig. 3.

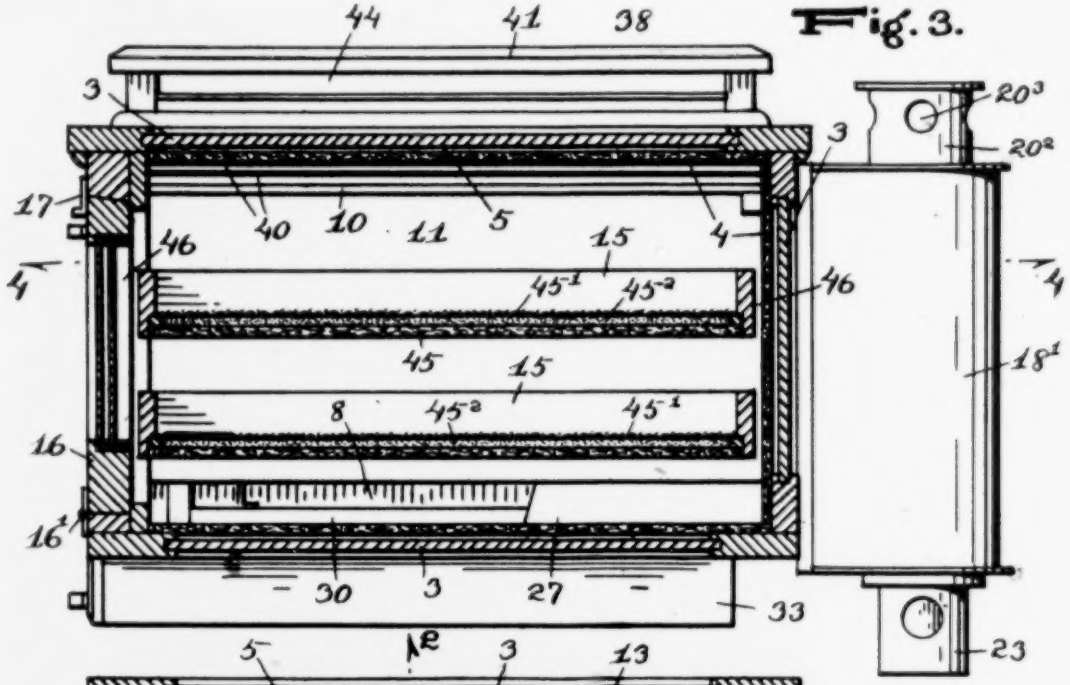
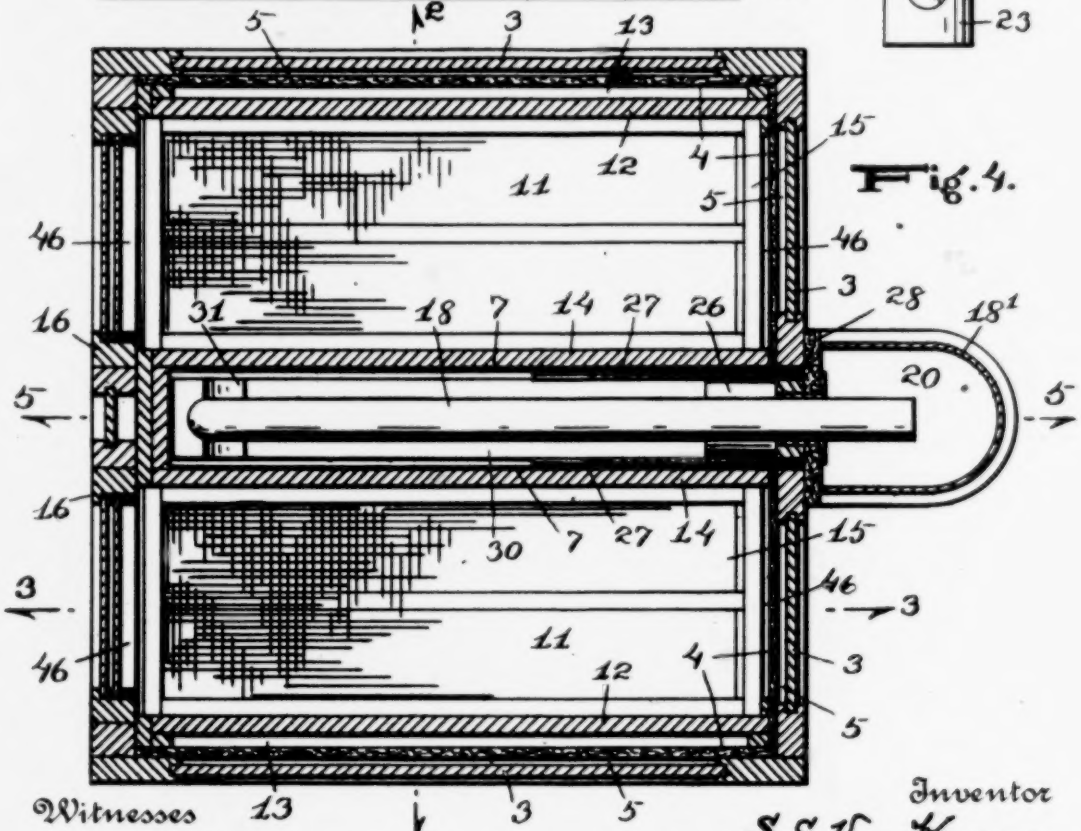


Fig. 4.



Witnesses

Stuart Hilder.

Inventor

S. S. Van Keuren

By E. W. Anderson & Son

Attorneys

724

S. S. VAN KEUREN.

INCUBATOR.

APPLICATION FILED JUNE 12, 1915.

1,160,793.

Patented Nov. 16, 1915.

3 SHEETS—SHEET 3.

Fig. 5.

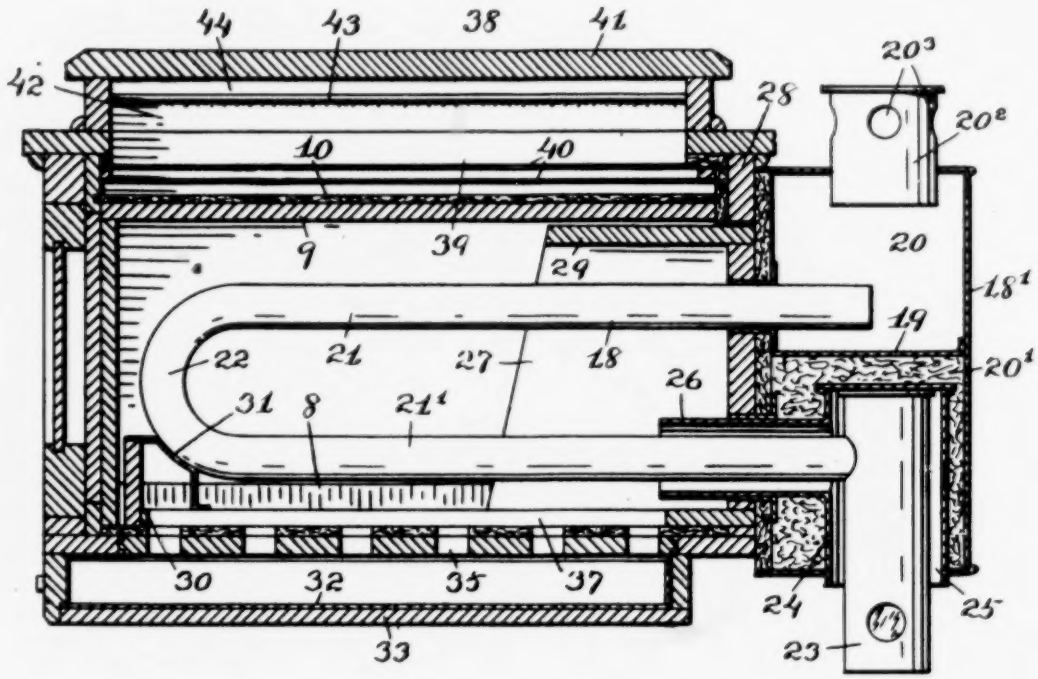
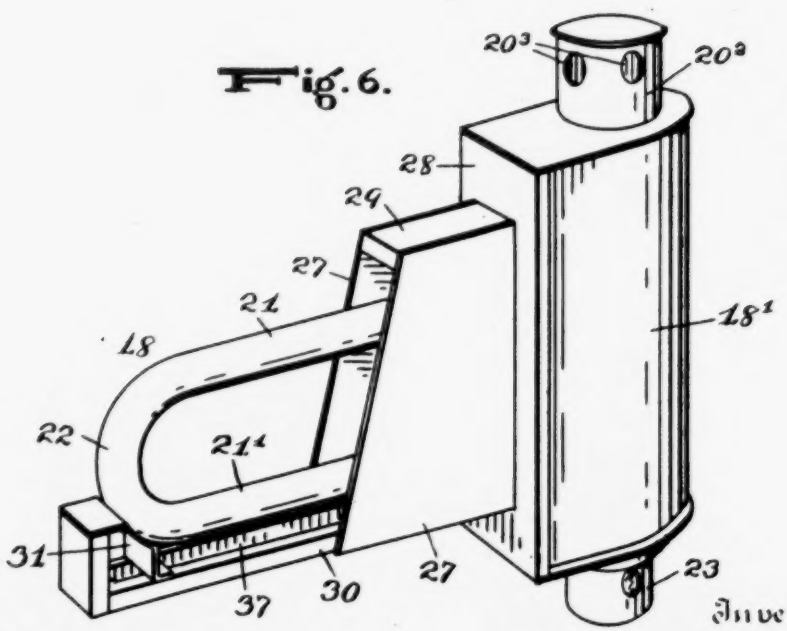


Fig. 6.



Witnesses

S. W. Hilder.

Inventor

S. S. Van Keuren

By E. W. Anderson & Son

Attorneys

UNITED STATES PATENT

SYLVANUS S. VAN KEUREN, OF ABERDEEN, SOUTH

INCUBATOR.

1,160,793. Specification of Letters Patent. Pate

Application filed June 12, 1915. Serial No. 33,705.

To all whom it may concern:

Be it known that I, SYLVANUS S. VAN KEUREN, a citizen of the United States, resident of Aberdeen, in the county of Brown and State of South Dakota, have made a certain new and useful Invention in Incubators; and I declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it appertains to make and use the invention, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

Figure 1 is a perspective view of the invention. Fig. 2 is a section on the line 2—2, Fig. 4. Fig. 3 is a section on the line 3—3, Fig. 4. Fig. 4 is a section on the line 4—4, Fig. 3. Fig. 5 is a section on the line 5—5, Fig. 4. Fig. 6 is a detail perspective view of the removable heater.

The invention has relation to incubators, and it consists in the novel construction and combinations of parts, as hereinafter set forth.

In the accompanying drawings, illustrating the invention, the numeral 2 designates the casing, having usually a framing provided upon each side and top and bottom with wooden insertion strips or panels 3 upon the outside, and fiber-board strips 4 upon the inside and spaced apart from the wooden strips or panels, to provide dead air spaces 5 for insulating purposes, said fiber-board strips meeting at the corners of the casing. At the center of the casing is a narrow vertical heating chamber, provided at each side with a metal plate 7, the two plates forming the side walls of said chamber and terminating near the bottom of the casing, from which they are separated by intervals 8, said heating chamber having a top 9 carrying a laterally extending deflector strip 10, located near the top and extending from end to end of the casing.

At each side of the heating chamber is an egg chamber 11, having an outer side wall 12 separated from the fiber-board strip by a space 13, constituting a second dead air or insulating space, and an inner side wall 14, located close to the radiator plate at this side. In each egg chamber are a plurality of egg trays 15, usually two, one over the other and having suitable support, usually sliding in guideways 15′, doors 16 in the front of the casing leading to the egg cham-

bers, said doors being at 16′ and having su each door being provi of glass or mica, sepa for insulation.

Fitting removably chamber is the radiato including a vertical m exteriorly of the incub horizontal partition 19 chambers 20, 20′. T horizontal upper and l connected by an inner of the upper branch h with the upper chamb of the lower branch ter tube 23, located in th designed for the intro source of heat supply, ney thereof. The upp ing tube terminates a lower portion of the heated air spreading in circulation being reta or upper chamber has 20², provided with la ings 20³.

The lower chamber inner lining 24, spaced proper of said chambe ing of asbestos or the This inner lining is a vertical tube, of large tube 23, from which space 25. The tube branch 26, of larger dia rounding the outer end branch 21′, said branch cation with the heating troduction of fresh a through the open bott The outer end of the nearest the lamp, is gu 27, 27. Usually the ver the heater has a backi fiber-board, to which th the guard plates 27 hav of wood or the like an of the same material, bo ried by said backing, sai a little longer than the its inner end having an metal support 31 theref

The backing of the he or door for the open

S. S. VAN KEUREN.

INCUBATOR.

APPLICATION FILED JUNE 12, 1915.

Patented Nov. 16, 1915.

3 SHEETS—SHEET 3.

Fig. 5.

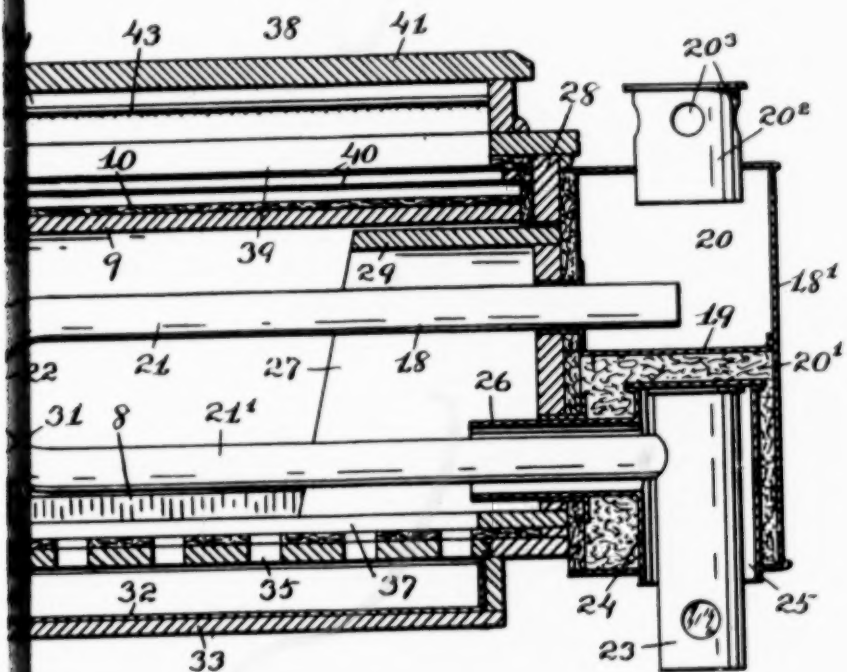
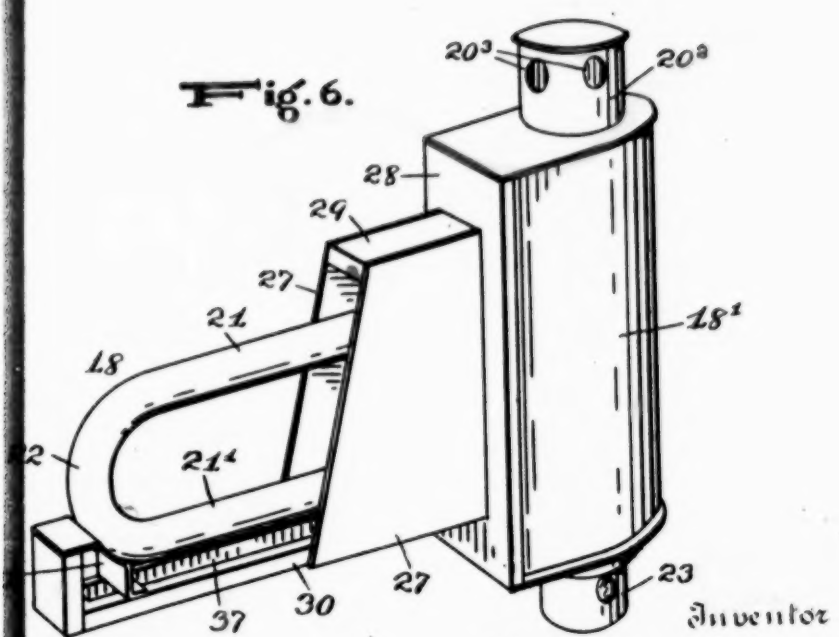


Fig. 6.



Inventor

S. S. Van Keuren

By E. W. Anderson & Son

Attorneys

Witness.

UNITED STATES PATENT OFFICE.

SYLVANUS S. VAN KEUREN, OF ABERDEEN, SOUTH DAKOTA.

INCUBATOR.

1,160,793. Specification of Letters Patent. Patented Nov. 16, 1915.

Application filed June 12, 1915. Serial No. 33,705.

To all whom it may concern:

Be it known that I, SYLVANUS S. VAN KEUREN, a citizen of the United States, resident of Aberdeen, in the county of Brown and State of South Dakota, have made a certain new and useful Invention in Incubators; and I declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it appertains to make and use the invention, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

Figure 1 is a perspective view of the invention. Fig. 2 is a section on the line 2—2, Fig. 4. Fig. 3 is a section on the line 3—3, Fig. 4. Fig. 4 is a section on the line 4—4, Fig. 3. Fig. 5 is a section on the line 5—5, Fig. 4. Fig. 6 is a detail perspective view of the removable heater.

The invention has relation to incubators, and it consists in the novel construction and combinations of parts, as hereinafter set forth.

In the accompanying drawings, illustrating the invention, the numeral 2 designates the casing, having usually a framing provided upon each side and top and bottom with wooden insertion strips or panels 3 upon the outside, and fiber-board strips 4 upon the inside and spaced apart from the wooden strips or panels, to provide dead air spaces 5 for insulating purposes, said fiber-board strips meeting at the corners of the casing. At the center of the casing is a narrow vertical heating chamber, provided at each side with a metal plate 7, the two plates forming the side walls of said chamber and terminating near the bottom of the casing, from which they are separated by intervals 8, said heating chamber having a top 9 carrying a laterally extending deflector strip 10, located near the top and extending from end to end of the casing.

At each side of the heating chamber is an egg chamber 11, having an outer side wall 12 separated from the fiber-board strip by a space 13, constituting a second dead air or insulating space, and an inner side wall 14, located close to the radiator plate at this side. In each egg chamber are a plurality of egg trays 15, usually two, one over the other and having suitable support, usually sliding in guideways 15′, doors 16 in the front of the casing leading to the egg chambers, said doors being hinged at the bottom at 16′ and having suitable top catches 17, each door being provided with double panes of glass or mica, separated by an air space for insulation.

Fitting removably within the heating chamber is the radiator pipe 18 of a heater, including a vertical metal casing 18′ located exteriorly of the incubator and divided by a horizontal partition 19 into upper and lower chambers 20, 20′. The heating tube has horizontal upper and lower branches 21, 21′, connected by an inner bend 22, the outer end of the upper branch having communication with the upper chamber and the outer end of the lower branch terminating in a vertical tube 23, located in the lower chamber and designed for the introduction of a suitable source of heat supply, as a lamp or the chimney thereof. The upper branch of the heating tube terminates about centrally of the lower portion of the upper chamber, the heated air spreading in said chamber and its circulation being retarded. The retarding or upper chamber has a top hood or stack 20^2, provided with lateral air exit openings 20^3.

The lower chamber is provided with an inner lining 24, spaced apart from the walls proper of said chamber and having a packing of asbestos or the like in the interval. This inner lining is also in the form of a vertical tube, of larger diameter than the tube 23, from which it is separated by a space 25. The tube 24 has a horizontal branch 26, of larger diameter than and surrounding the outer end of the heating tube branch 21′, said branch 26 having communication with the heating chamber for the introduction of fresh air, which passes in through the open bottom of the tube 24. The outer end of the heating tube, being nearest the lamp, is guarded by side plates 27, 27. Usually the vertical metal casing of the heater has a backing 28 of wood and fiber-board, to which the casing is secured, the guard plates 27 having a cover strip 29 of wood or the like and a bottom strip 30 of the same material, both strips being carried by said backing, said bottom strip being a little longer than the heater tube and at its inner end having an upwardly extending metal support 31 therefor.

The backing of the heater forms a closure or door for the open end of the heating chamber, the bottom strip resting upon the

bottom of the heating chamber, and the exterior metal casing being supported through engagement of the backing 28 with the upper and lower walls of the end of the heating chamber.

Below the heating chamber a moistening tray 32 is provided, said tray sliding in a supporting and inclosing box 33, the top of said box being provided with a series of perforations or slots 35 communicating with a slot 37 of the bottom strip of the heater, said slot communicating with the heating chamber. The moistening tray is suitably provided with water, usually being filled with sand saturated with water. This tray and its inclosing box are closely jointed, and are designed to be practically airtight.

Projecting above the top of the incubator, centrally thereof and running from front to back, is a ventilator 38, communicating with the interior of the casing by a slot 39 in the top of the casing, said slot being guarded by one or more thicknesses of thin felt 40, in order to impede the circulation of the air. The ventilator is provided with a suitable top 41, a vertical passage 42, guarded at the top by a screen 43 against the admission of insects and dust, and lateral openings 44, leading from said passage.

The egg trays are provided each with a bottom 45 of fiber-board and a false bottom 45′ of wire screen cloth, located above and separated from the fiber-board bottom by a space 45^2, in which sand is located. The eggs are turned twice daily, in practice, the trays being at the same time turned end for end and the bottom tray being placed at the top and vice versa, the trays being suitably numbered or tagged for identification.

The intermixed heat and fumes from the lamp are confined to the heater proper, and are not allowed entrance to the heating chamber or to the egg chambers.

The heated air in the heating chamber, the temperature of which is made higher by the side radiator plates, will pass out at the bottom at each side, under said radiator plates and under the lower egg trays, passing thence endwise of the egg chambers under the egg trays and up through passages 46 between the ends of the egg trays and the end walls of the egg chambers, the outer sides of the egg trays making a close joint with the sides of the egg chambers, to prevent rising of the heated air except at the ends of the trays. The heated air as it rises above the upper egg trays will be deflected outwardly by the deflector strip, and will pass around the outer edges of said strip into the narrow passage between the deflector strip and the top of the egg chambers, through the felt strips and up through the ventilator. The circulation of the heated air is always horizontal and upward, and never downward, and this circulation is made less rapid by the retarding felt strips of the ventilator, whereby the amount of heat required is reduced. The fresh air passing into the heating chamber is mixed with moisture from the moistening tray before it is admitted to the egg chambers.

What I claim is:—

1. In an incubator, lateral egg chambers, a central heating chamber, egg trays in said chambers having imperforate bottoms extending entirely across said chambers, the lower of said trays and the bottoms of the egg chambers being spaced apart to provide horizontal air passages and the said trays being spaced apart from the ends of said chambers to provide vertical air passages, said heating chamber having side walls provided with bottom openings in communication with said horizontal air passages.

2. In an incubator, lateral egg chambers, a central heating chamber, egg trays in said chambers having imperforate bottoms extending entirely across said chambers, the lower of said trays and the bottoms of the egg chambers being spaced apart to provide horizontal air passages and the said trays being spaced apart from the ends of said chambers to provide vertical air passages, said heating chamber having side walls composed of metal plates provided with bottom openings in communication with said horizontal air passages, and a deflecting strip carried by the top of the heating chamber and extending laterally partly over the egg trays, and spaced apart from the top of the egg chambers to provide upper horizontal air passages, a ventilator communicating with said upper horizontal air passages, and a moistening tray located below and communicating with the bottom of said heating chamber.

3. In an incubator, lateral egg chambers, a central heating chamber, egg trays in said chambers having imperforate bottoms extending entirely across said chambers, the lower of said trays and the bottoms of the egg chambers being spaced apart to provide horizontal air passages, and the trays being spaced apart from the ends of said chambers to provide vertical air passages, said heating chamber having side walls provided with bottom openings in communication with said horizontal air passages, and a removable heater for the heating chamber including a reversely bent tube having its ends opening exteriorly of said chamber.

4. In an incubator, lateral egg chambers, a central heating chamber, egg trays in said chambers having imperforate bottoms extending entirely across said chambers, the lower of said trays and the bottoms of the egg chambers being spaced apart to provide horizontal air passages, and the trays being spaced apart from the ends of said

chambers to provide vertical air passages. and a deflecting strip carried by the top of the heating chamber and extending laterally partly over the egg trays. said heating chamber having side walls provided with bottom openings in communication with said horizontal air passages. and a removable heater including a reversely bent tube having its ends opening exteriorly of said chamber. a lamp tube connected to the lower end of the heating tube. and a fresh air inlet tube surrounding the lamp tube having communication with said chamber.

5. In an incubator. lateral egg chambers. a central heating chamber. egg trays in said chambers having imperforate bottoms extending entirely across said chambers. the lower of said trays and the bottoms of the chambers being spaced apart to provide horizontal air passages. and the trays being spaced apart from the ends of said chambers to provide vertical air passages. a deflecting strip carried by the top of the heating chamber *and extending laterally* partly over the egg trays. said heating chamber having side walls provided with bottom openings in communication with said horizontal air passages. and a removable heater including a reversely bent tube having its ends opening exteriorly of the said chamber. a lamp tube connected to the lower end of the heating tube. a fresh air inlet tube surrounding the lamp tube and communicating with said chamber. a retarding box surrounding the upper end of said heating tube. a moistening tray underlying the heating chamber and having communication therewith. and a ventilator overlying the heating chamber.

6. In an incubator. lateral egg chambers. a central heating chamber. egg trays in said chambers having imperforate bottoms extending entirely across said chambers. the lower of said trays and the bottoms of the egg chambers being spaced apart to provide horizontal air passages. and the trays being spaced apart from the ends of said chambers to provide vertical air passages. said chamber having side walls provided with bottom openings in communication with said horizontal air passages. a deflecting strip extending laterally partly over the egg trays and spaced apart from the top of the egg chambers to provide upper horizontal air passages. a moistening tray underlying the heating chambe
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SYLVANUS S.

Witnesses:
EZRA L. BAKER,
THOMAS L. ARNO

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3. In an incubator, lateral egg chambers, a central heating chamber, egg trays in said chambers having imperforate bottoms extending entirely across said chambers, the lower of said trays and the bottoms of the egg chambers being spaced apart to provide horizontal air passages, and the trays being spaced apart from the ends of said chambers to provide vertical air passages, said heating chamber having side walls provided with bottom openings in communication with said horizontal air passages, and a removable heater for the heating chamber including a reversely bent tube having its ends opening exteriorly of said chamber.

4. In an incubator, lateral egg chambers, a central heating chamber, egg trays in said chambers having imperforate bottoms extending entirely across said chambers, the lower of said trays and the bottoms of the egg chambers being spaced apart to provide horizontal air passages, and the trays being spaced apart from the ends of said

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7. In an incubator, lateral egg chambers, a central heating chamber, egg trays in said chambers having imperforate bottoms extending entirely across said chambers, the lower of said trays and the bottoms of the egg chambers being spaced apart to provide horizontal air passages, and the trays being spaced apart from the ends of said chambers to provide vertical air passages, said chamber having side walls provided with bottom openings in communication with said horizontal air passages, a deflecting strip extending laterally partially over the egg trays and spaced apart from the top of the egg chambers to provide upper horizontal air passages, and a removable heater comprising a door for the open end of the heating chamber, a bottom strip resting upon the floor of said chamber, a reversely bent tube having its ends opening exteriorly of the said chamber and supported by said door and bottom strip, a lamp tube connected to the lower end of said tube and a retarding box surrounding the upper end of said tube.

8. In an incubator, lateral egg chambers, a central heating chamber, egg trays in said chambers having imperforate bottoms extending entirely across said chambers, the lower of said trays and the bottoms of the egg chambers being spaced apart to provide horizontal air passages and the trays being spaced apart from the ends of said chambers to provide vertical air passages, said chamber having side walls provided with bottom openings in communication with said horizontal air passages, a deflecting strip extending laterally partly over the egg trays and spaced apart from the top of the egg chambers to provide upper horizontal air passages, said egg trays having upper screen bottoms spaced apart form the lower imperforate bottoms.

In testimony whereof I affix my signature, in presence of two witnesses.

SYLVANUS S. VAN KEUREN.

Witnesses:
EZRA L. BAKER,
THOMAS L. ARNOLD.

KAISERLICHES PATENTAMT

AUSGEGEBEN DEN 11. NOVEMBER 1904.

LIBRARY U.S. PATENT OFFICE DEC 16 1904

PATENTSCHRIFT

№ 155917

KLASSE 45 h.

E. STULIK IN LICHTENBERG B. BERLIN.

Brutverfahren und Vorrichtung mit gruppenweiser Beschickung und gleichzeitiger Behandlung der zu verschiedenen Zeiten in den Brutapparat eingesetzten Eiergruppen.

Patentiert im Deutschen Reiche vom 7. November 1901 ab.

Bei den bisher bekannten Brutverfahren mit gruppenweiser Beschickung der verschiedenen Abteilungen des Brutapparates und gleichzeitiger Behandlung der zu verschiedenen Zeiten in die Brutvorrichtung eingesetzten Eiergruppen ist auf die Erhaltung einer gleichförmigen Temperatur im ganzen Brutraum zu wenig Rücksicht genommen. Bei den bekannten Verfahren dieser Art werden die einzelnen, zu verschiedenen Zeiten einzusetzenden Gruppen mit Bezug auf die Heizmittelführung parallel geschaltet. Entweder werden dabei die einzelnen Eierträger in einem von einem aufsteigenden Warmluftstrom durchzogenen Brutraum nacheinander in gewissen Zeitabschnitten seitlich verschoben, bis sie den ganzen Brutraum durchwandert haben, oder aber es wird eine Reihe zu verschiedenen Zeiten zu belegender Eierträger unter einem Warmwasserkessel angeordnet und während der Brutzeit jeder Eierträger für sich in passende Entfernung vom Heizkessel gebracht. Im ersten Fall wird der gegen Ende der Brütezeit wachsenden Eigenwärme der Eier nicht genügend Rechnung getragen, während im letzteren Fall, wo der oben im Brutraum angeordnete Warmwasserkessel den Brutraum durch Strahlung heizt, nach unten zu ein zu rascher Temperaturabfall eintritt, so daß nicht genügend viel Abstufungen für die Veränderung der Stellung der Eierträger während der Brütezeit gegeben sind. Demgegenüber werden gemäß der vorliegenden Erfindung die zu verschiedenen Zeiten in den Brutraum eingesetzten Eiergruppen immer unmittelbar ein und demselben Warmluftstrom ausgesetzt, und zwar derart, daß die Eiergruppen fortschreitend oder stufenweise in der Richtung des Warmluftstromes von der Wärmequelle entfernt werden, so daß die einzelnen Gruppen schließlich den ganzen Brutraum durchwandern. Hierdurch wird erreicht, daß die zuerst frisch in den Brutraum gebrachten Eiergruppen der vollen Wärme des Warmluftstroms ausgesetzt sind, während die älteren und im Brutraum weitergerückten Eiergruppen dem Warmluftstrom erst ausgesetzt werden, nachdem dieser bereits einen Teil seiner Wärme abgegeben hat. Es ist dadurch die Möglichkeit gegeben, daß unter Berücksichtigung der von den Eiern bei vorgeschrittenem Brüten entwickelten Eigenwärme in allen Abteilungen des Brutraumes eine gleichförmige Temperatur herrscht, indem in den über- oder nebeneinander liegenden Abteilungen die dem Warmluftstrom entzogene Wärme durch die Eigenwärme der Eier ergänzt wird. Es wird somit verhütet, daß die älteren Abteilungen einem zu hohen Wärmegrad ausgesetzt werden.

Die für das neue Brutverfahren eingerichteten Vorrichtungen bieten insbesondere für kleinere Betriebe den Vorteil, daß während des Ganges der Vorrichtung in bestimmten kleineren Zeiträumen frische Eiergruppen eingelegt werden können. Zweckmäßig befinden sich die verschiedenen Abteilungen übereinander, weil hierdurch einerseits eine günstige Verbindung der Vorrichtung mit dem als Glucke dienenden Raum und andererseits eine günstige Durchlüftung, also eine

same Ableitung der aus den bebrüteten Eiern sich entwickelnden Gase ermöglicht wird.

Auf der Zeichnung ist die neue Brutvorrichtung veranschaulicht, und zwar zeigt Fig. 1 die Vorderansicht bei teilweisem Schnitt, Fig. 2 den Längenschnitt, Fig. 3 den Querschnitt nach *A-A* von Fig. 1, Fig. 4 den Querschnitt nach *B-B* von Fig. 2; Fig. 5 zeigt schematisch eine abgeänderte Ausführungsform.

Bei der Ausführung Fig. 1 bis 4 sind in dem Brutraum *a* die Kästen *b* übereinander angeordnet. Die erwärmte Brütluft tritt durch das Rohr *c* unter den untersten Brutkasten. Die Kästen *b* sind mit Durchlochungen versehen, welche der erwärmten Luft das Aufsteigen durch alle durch die Kästen *b* gebildeten Abteilungen gestattet. Die oberste Abteilung ist mit dem Luftabzug *d* versehen. Der Brutraum *a* besitzt auf der einen Seite die den Kästen *b* entsprechenden, übereinander angeordneten Türen *f* (Fig. 2). Die Brutkästen *b* können einzeln herausgenommen werden. Der Brutraum *a* ist zweckmäßig von einem Mantel *w* zur Aufnahme erwärmten Wassers umgeben, um Wärmeabgabe nach außen zu verhindern. Eine äußere Tür *g* vor den Türen *f* kann als Schutz gegen Wärmeausströmung durch die Türen *f* angeordnet sein, wie Fig. 2 zeigt. Die Einrichtungen zum Schutze gegen Wärmeabgabe nach außen gehören nicht unmittelbar zur vorliegenden Erfindung.

Bei der dargestellten Ausführung befindet sich der Brutraum *a* über dem bekannten, als Glucke dienenden Behälter *h*. Innerhalb dieses Behälters *h* liegt die Heizkammer *i*, die von irgend einer Wärmequelle, wie Pfeil *k* andeutet etwa durch eine bei *s* aufgestellte Lampe, mit heißer Luft beschickt wird. Ein nach außen führender Abzug für die Heizgase kann bei *l* vorgesehen sein.

Das Luftzuführrohr *c* ist durch die Kammer *i* hindurchgeführt. Die Heizgase strömen aus dem Raum *i* durch eine Öffnung *m* in die Kammer *y* und verteilen sich von hier in die Röhren *n*, die das Wasser im Mantel *w* erwärmen. Die Gase sammeln sich schließlich wieder im Raum *x*, um von hier aus bei *r* abzuziehen.

Beim Betrieb wird zunächst die unterste Brutabteilung beschickt und nach einiger Zeit der unterste Brutkasten mit den Eiern herausgenommen und in die nächst obere Abteilung gebracht. Die Eier könnten auch einfach in die nächst obere Abteilung herübergelegt werden. Dann folgt die erneute Beschickung der untersten Abteilung. Dieser Vorgang wiederholt sich, so daß allmählich die einzelnen Gruppen bis nach der obersten Abteilung gelangen. Mit dem Luftabzug *d* kann in bekannter Weise eine Vorrichtung *o* verbunden sein, die abhängig von der Wärme in der obersten Brutabteilung die Beheizung mittels der Hebelübersetzung *p* regelt, indem sie die Verschlußklappe *q* für den Abzug *l* der Heizkammer *i* mehr oder weniger öffnet oder schließt.

Die beschriebene Brutvorrichtung läßt sich in ihren Einzelheiten abändern. Wie Fig. 5 zeigt, können die Abteilungen 1 bis 7, welche nacheinander von dem Warmluftstrom und von den Eiern durchwandert werden, nebeneinander angeordnet sein. In jedem Falle ist es wesentlich, daß die von den Eiern mit der Zeit entwickelte Eigenwärme für die gleichmäßige Erhaltung der Temperatur im ganzen Brutraum berücksichtigt wird. Die Anordnung eines Heizmantels ist für das Verfahren nicht unbedingt erforderlich, derselbe verhütet aber Unregelmäßigkeiten durch Wärmeausstrahlung nach außen. Durch die beschriebene Vorrichtung wird vor allem vermieden, daß die Eier gegen Ende der Brütezeit einem zu hohen Wärmegrade ausgesetzt sind.

Patent-Ansprüche:

1. Brutverfahren mit gruppenweiser Beschickung und gleichzeitiger Behandlung der zu verschiedenen Zeiten in den Brutapparat eingesetzten Eiergruppen, dadurch gekennzeichnet, daß die in den Brutraum zu verschiedenen Zeiten eingesetzten Eiergruppen demselben Warmluftstrom unmittelbar in der Weise ausgesetzt werden, daß die Eiergruppen stufenweise in der Richtung des Warmluftstromes in größere Entfernung von der Wärmequelle gebracht werden, wobei der zuerst die frisch in den Brutraum gebrachte Eiergruppe und dann nacheinander die älteren Gruppen bestreichende Warmluftstrom auf die einzelnen Eiergruppen so viel Wärme überträgt, daß unter Berücksichtigung der zu derselben Zeit verschiedenen Eigenwärmen der Eier im ganzen Brutraum eine gleichförmige Temperatur herrscht.

2. Brutvorrichtung zur Ausführung des Verfahrens nach Anspruch 1, dadurch gekennzeichnet, daß die zur gruppenweisen Weiterschaltung der Eier dienenden, der Brütluft freien Zutritt zu den Eiern gestattenden Eierträger, welche die von dem Warmluftstrom nacheinander durchzogenen Einzelabteilungen bilden, neben- oder übereinander angeordnet sind.

Hierzu 1 Blatt Zeichnungen.

Fig. 1.

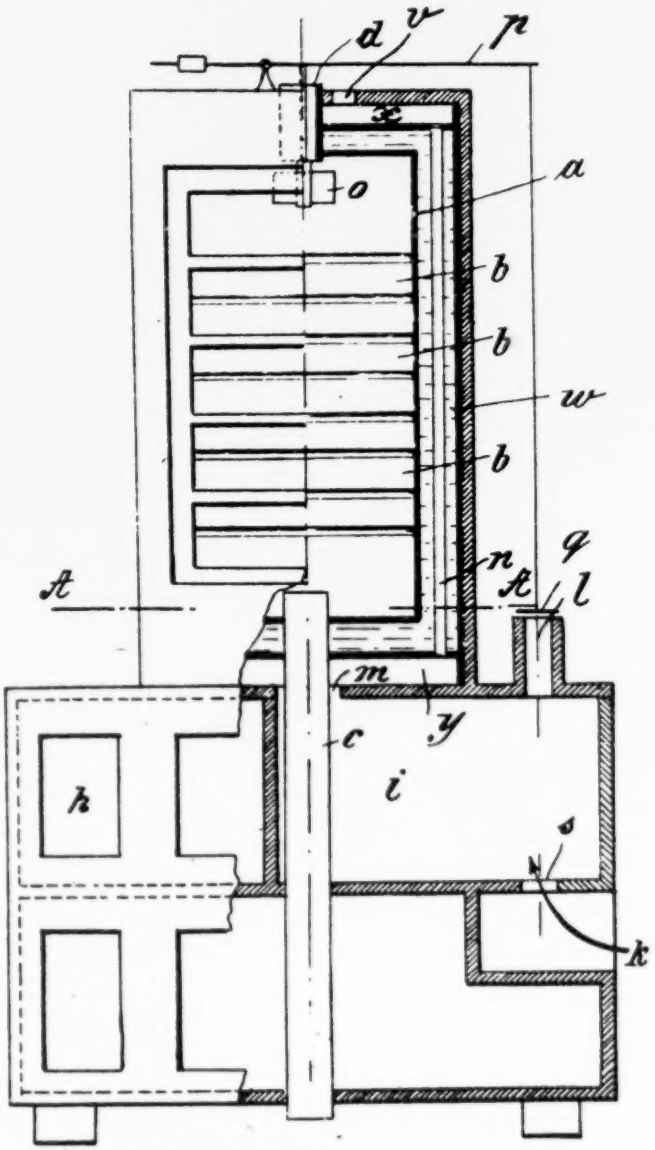


Fig. 2.

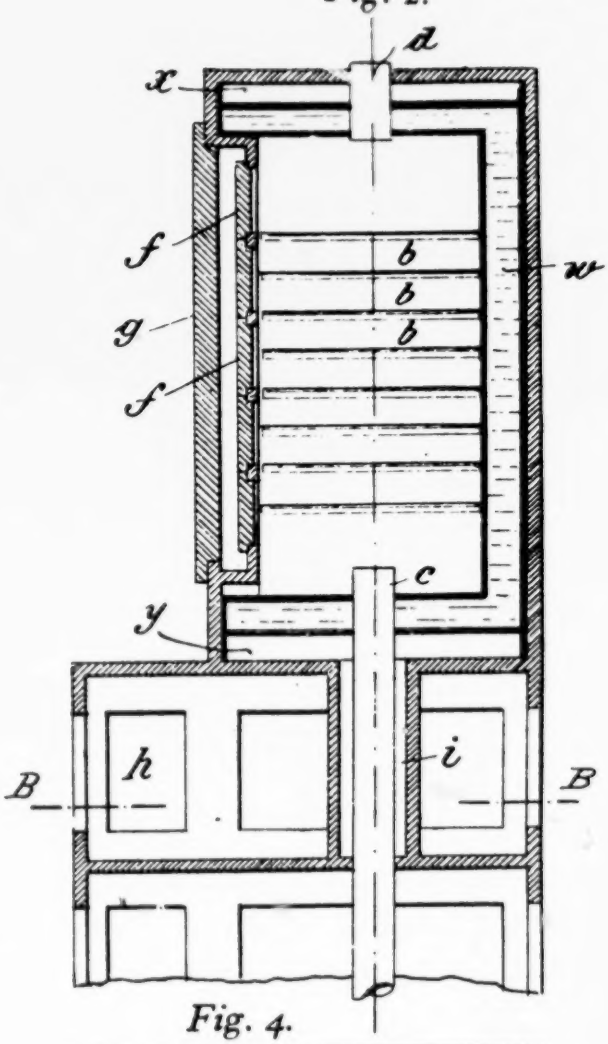


Fig. 3.

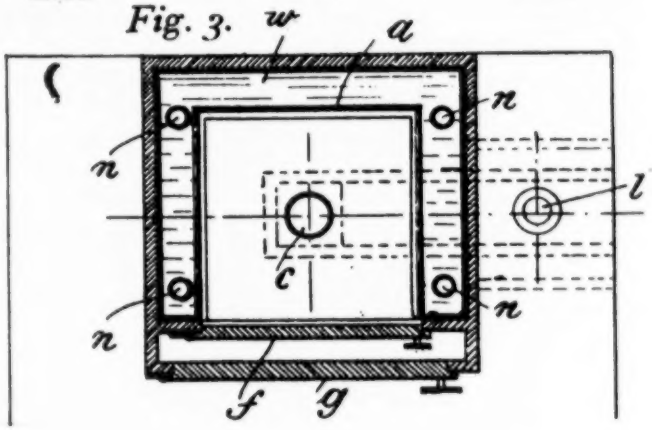
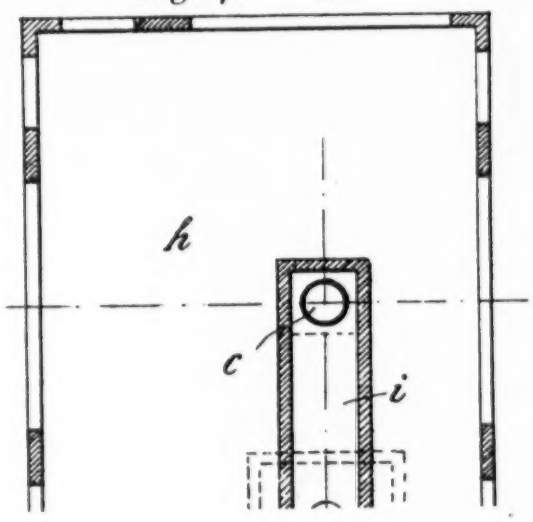


Fig. 4.



Part of Def. Ex. P

DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE

To all persons to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a [redacted] Translation made by the Official Translator from the Records of this Office of the Specification, in the matter of the

German Letters Patent to

E. Stulik,

dated November 7, 1901, Number 155,917,

for

Improvement in process and device for group charging and simultaneous treatment of the groups of eggs inserted at different times into the incubating apparatus.

IN TESTIMONY WHEREOF I have hereunto set my hand and caused the seal of the Patent Office to be affixed, at the City of Washington, this twenty-seventh day of August, in the year of our Lord one thousand nine hundred and thirty-one and of the Independence of the United States of America the one hundred and fifty-sixth.

Def. Ex. P

DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE

To all persons to whom these presents shall come, Greeting:

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ATTEST:

Chief of Division.

Thomas E. Robertson
Commissioner of Patents.

Translation of German Patent No. 155917 to E. Stulik in Lichtenberg near Berlin, Class 45 h; patented in Germany from November 7, 1901; published November 11, 1904.

Incubating process and device for group charging and simultaneous treatment of the groups of eggs inserted at different times into the incubating apparatus.

In the incubating processes hitherto known with group charging of the various compartments of the incubating apparatus and simultaneous treatment of the groups of eggs inserted at different times into the incubating apparatus too little attention has been paid to the maintenance of a uniform temperature in the whole incubating room. In known processes of this kind the individual groups inserted at different times have been arranged in parallel with respect to the supply of heat medium. Either the individual egg carriers were displaced laterally at given time intervals in succession in an incubating room traversed by an ascending current of hot air, until the whole incubating room had been passed through, or a row of egg carriers to be charged at different times was placed under a hot water boiler, and each egg carrier by itself removed to a suitable distance from the boiler during incubation. In the first case the self-heat of the eggs increasing toward the end of the incubating period is not taken sufficiently into account, while in the latter case, where the hot water boiler arranged at the top of the incubating room heats the same by radiation, a too rapid fall in temperature takes place toward the bottom, so that not enough steps are allowed for changing the position of the eggs during the incubating period. On the other hand, the egg groups inserted into the incubating room at different times according to the present invention are always exposed directly to the very same current of hot air, in such a way that the groups are removed progressively or by stages from the source of heat in the direction of the hot air current and the

individual groups traverse in the end the entire incubating room. In this way the result is attained, that the egg groups freshly placed in the incubating room are exposed to the full heat of the hot air current, while the older groups, farther advanced in the incubating room, are exposed to the current, only after it has given up a part of its heat. The possibility is thus offered of maintaining a uniform temperature in all compartments of the incubating room, while taking into consideration the self-heat developed by the eggs in the later stages of incubation, in that the heat abstracted from the air current in the superimposed or adjoining compartments is supplemented by the self-heat of the eggs. In this way the compartments with older eggs are prevented from exposure to too great heat.

The devices constructed for the new incubating process offer the advantage, especially for smaller operations, that, while the apparatus is working, fresh groups of eggs can be inserted at given, shorter intervals. The different compartments are appropriately superimposed, as in this way a good connection with the heating room is made possible, on the one hand, and, on the other hand, good ventilation, therefore effective withdrawal of the gases developed from the hatched eggs.

The new incubating device is illustrated on the drawing. [illegible] shows a front view with partial section. Fig. 2 a longi-

individual groups traverse in the end the entire incubating room. In this way the result is attained, that the egg groups freshly placed in the incubating room are exposed to the full heat of the hot air current, while the older groups, farther advanced in the incubating room, are exposed to the current, only after it has given up a part of its heat. The possibility is thus offered of maintaining a uniform temperature in all compartments of the incubating room, while taking into consideration the self-heat developed by the eggs in the later stages of incubation, in that the heat abstracted from the air current in the superimposed or adjoining compartments is supplemented by the self-heat of the eggs. In this way the compartments with older eggs are prevented from exposure to too great heat.

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The new incubating device is illustrated on the drawing. Fig. 1 shows a front view with partial section, Fig. 2 a longitudinal section, Fig. 3 a cross section following A-A of Fig. 1, Fig. 4 a cross section following B-B of Fig. 2; Fig. 5 shows diagramatically a modified form of construction.

In the embodiment of Figs. 1 to 4 the cases b are arranged in superposition in the incubating room a. The heated air enters through the pipe e under the lowermost case. The cases b are provided with perforations, which permit the heated air to rise through all the compartments formed by the cases b. The uppermost compartment is provided with the air take-off d. The incubating

a possesses doors f superimposed on one side, corresponding to the cases b (Fig.2). The cases b can be individually removed. The incubating room a is suitably enclosed with a jacket w for receiving heated water, to prevent delivery of heat to the outside. Another g may be arranged in front of the doors f to protect against the exit of heat through these doors, as Fig. 2 shows. The devices for protecting against loss of heat to the outside do not directly appertain to the present invention.

In the embodiment represented the incubating room is located above the familiar container h for the heating apparatus. The heating chamber i lies inside of this container, which may be charged with hot air from any kind of heat source, perhaps, as indicated by arrow k, by a lamp erected at s. A take-off for the heating gases leading to the outside may be provided at l.

The air supply pipe c is passed through the chamber i. The hot gases flow from the chamber i through an opening m into the chamber y, whence they are distributed into the pipes n, which heat the water in the jacket w. The gases finally collect in the chamber x, whence they pass out at v.

When the apparatus is to be operated, the lowermost compartment is first charged and after some time the lowermost case is removed with the eggs and placed in the next higher compartment. The eggs could also be simply transferred to the next higher compartment. The lowermost compartment is then charged again. This operation is repeated, so that the individual groups gradually come to reach the uppermost compartment. A device c may be connected with the air take-off d, which regulates the heating by means of the lever transmission p independently of the heat in the uppermost compartment by opening or closing more or less the trap-door q for the take-off l of the heating chamber i.

The incubating device described may be modified in its details. As Fig. 5 shows, the compartments 1 to 7, which are

traversed in succession by the hot air current and by the eggs may be arranged so as to adjoin. In any case it is essential that the self-heat developed in time by the eggs should be taken into consideration in keeping the temperature uniform in the whole incubating room. The arrangement of a heating jacket is not absolutely indispensable to the process, but it prevents irregularities caused by the radiation of heat to the outside. The device described first of all guards the eggs toward the end of the incubating period from exposure to too great heat.

Patent Claims.

1. Incubating process for group charging and simultaneous treatment of groups of eggs inserted at different times into the incubating apparatus, characterized thereby, that the egg groups inserted at different times into the incubating room are directly exposed to the same current of hot air thereby, that the groups of eggs are moved by stages in the direction of the hot air current more and more from the source of heat; while this is taking place, the hot air current, first brushing the eggs freshly laid in the incubating room and then in succession the older groups, transfers to the individual groups so much heat that a uniform temperature prevails in the entire incubating room, when the various degrees of self-heat of the eggs at the samt time is taken into consideration.

2. Incubating device for applying the process according to claim 1, characterized thereby, that the egg carriers, serving to move the eggs in groups and giving the incubating air free access to the eggs, which form the individual compartments traversed successively by the hot air current, are arranged side by side or superimposed.

Tr/GWH
8/26/31

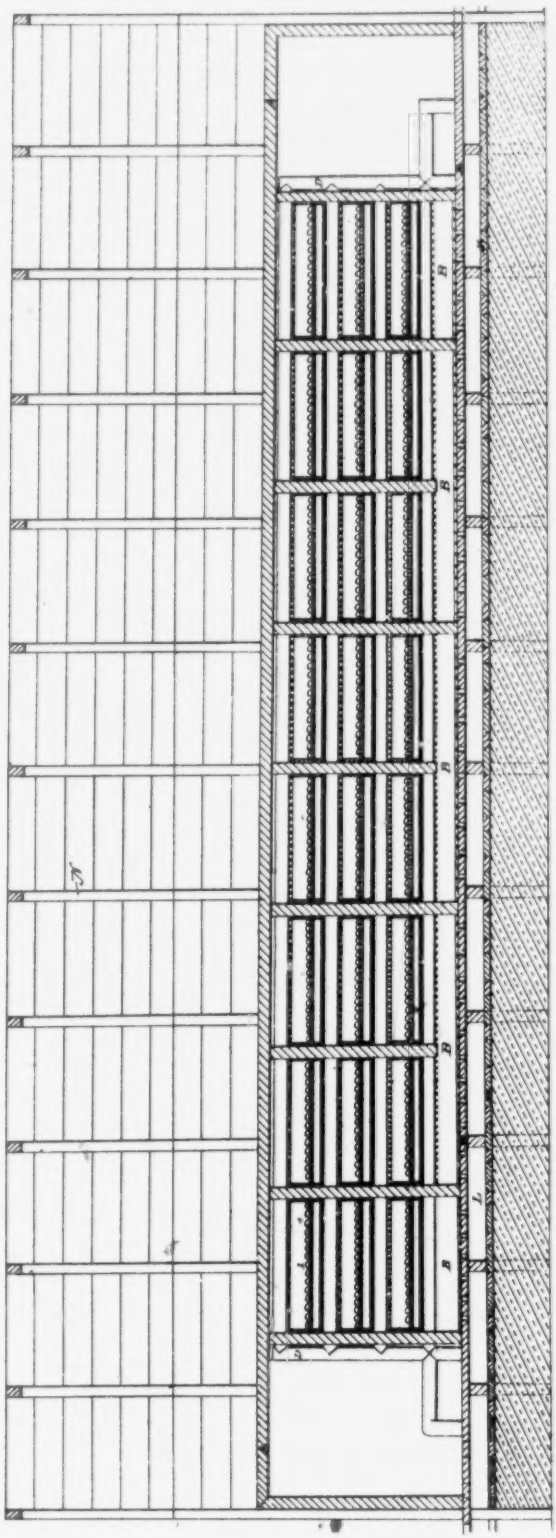
883 (Defendants' Exhibit P, Letters Patent No. 3,019 to N. E. Guerin, March 30, 1843.)

4 Sheets—Sheet 4.

N. E. GUERIN.

ARTIFICIAL METHOD OF REARING CHICKENS.

No. 3,019. Patented Mar. 30. 1843.



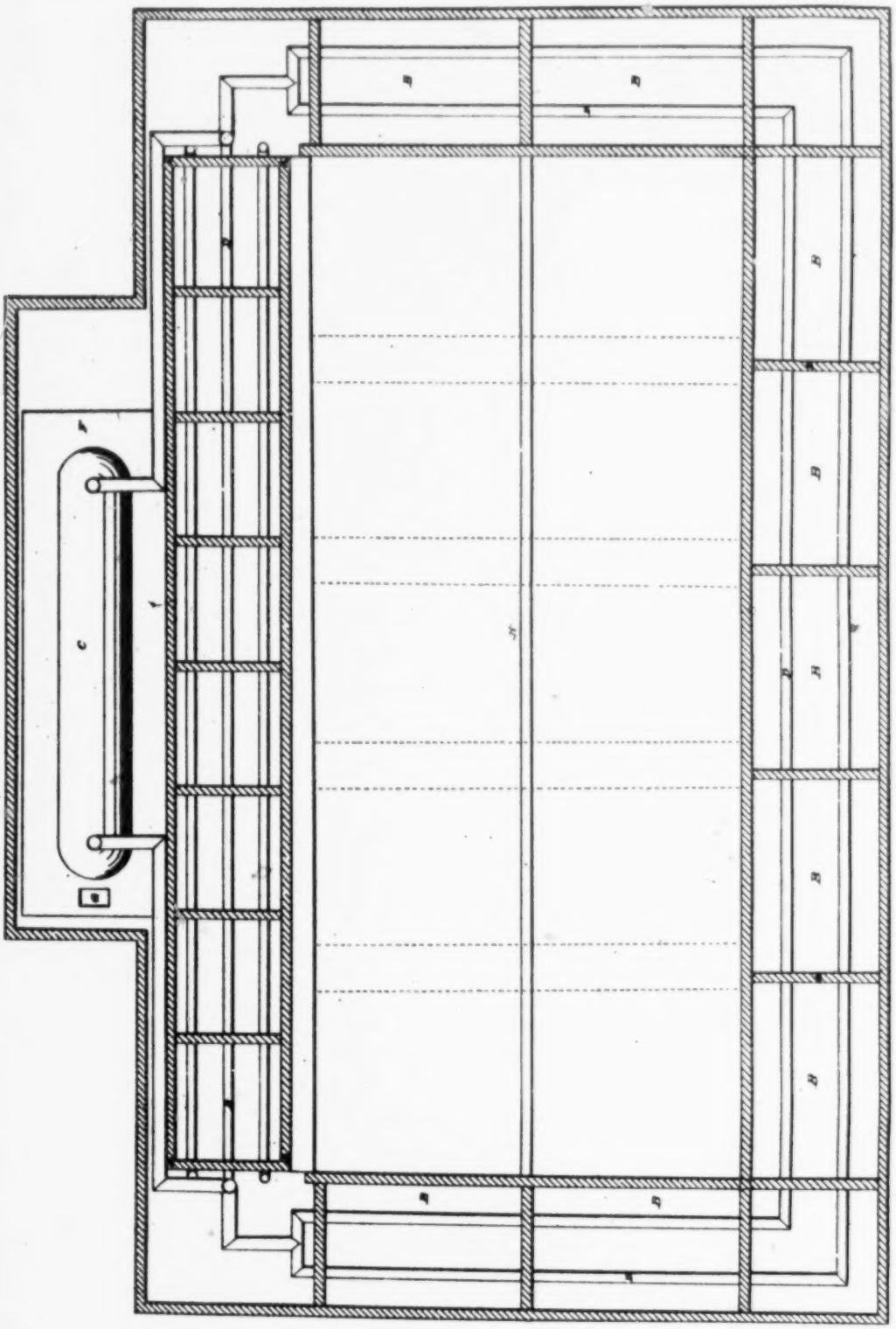
Inventor
N. E. Guerin

748

N. E. GUERIN.

ARTIFICIAL METHOD OF REARING CHICKENS.

No. 3,019. Patented Mar. 30, 1843.



Inventor

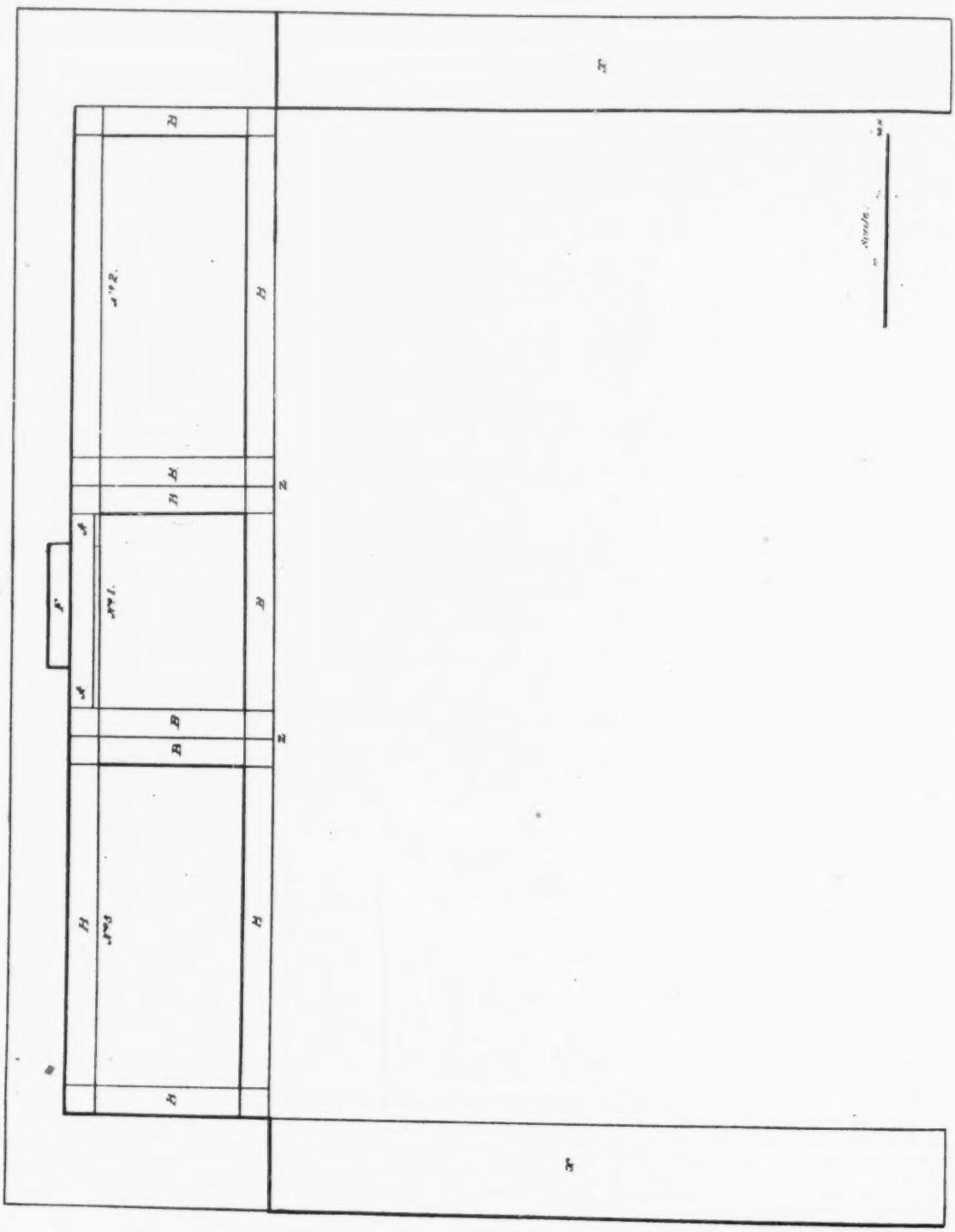
N. E. Guerin

750

N. E. GUERIN.

ARTIFICIAL METHOD OF REARING CHICKENS.

No. 3,019. Patented Mar. 30, 1843.



Inventor:

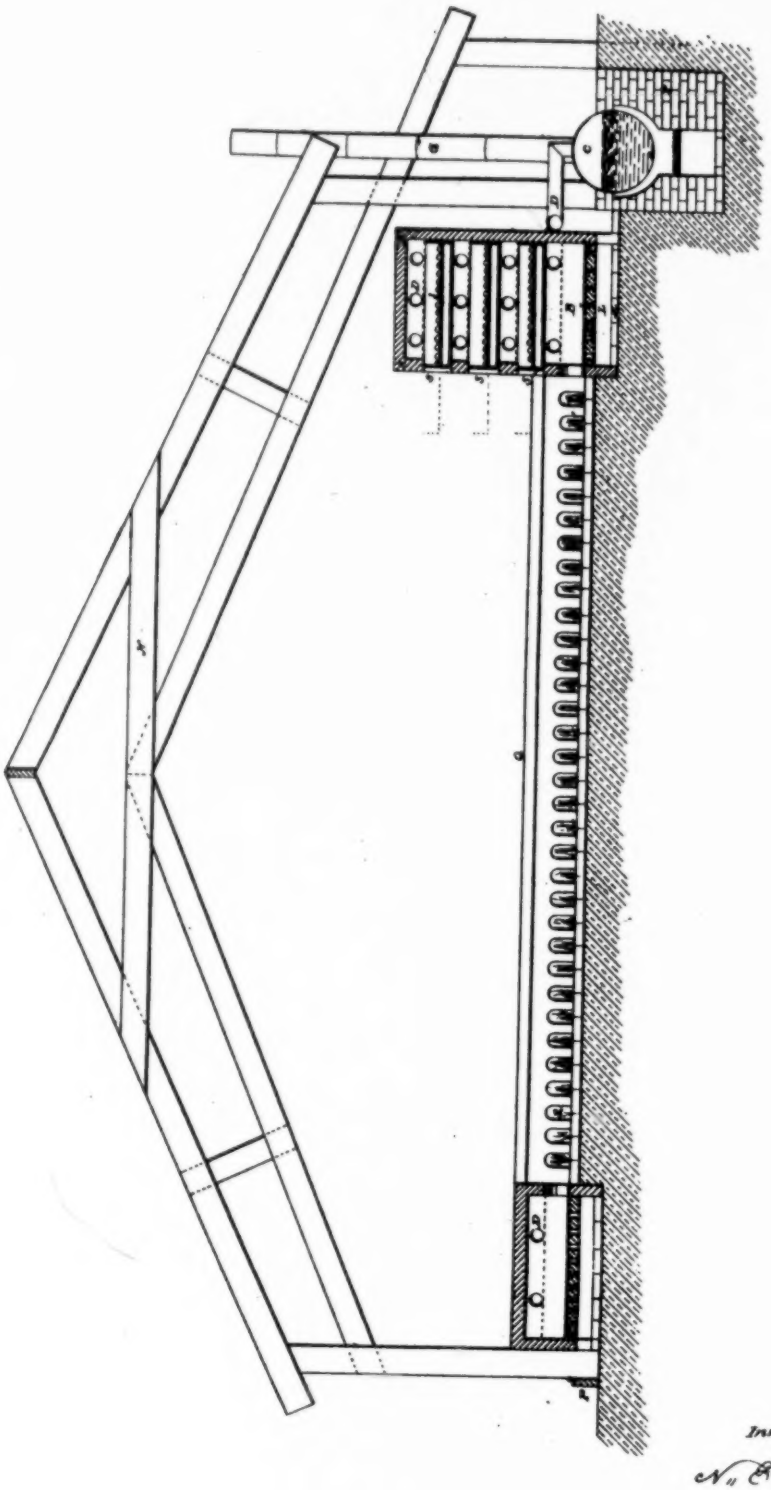
N. E. Guerin

752

N. E. GUERIN.

ARTIFICIAL METHOD OF REARING CHICKENS.

No. 3,016. Patented Mar. 30, 1843.



Inventor:

N. E. Guerin

UNITED STATES PATENT

NAPOLEON E. GUERIN, OF NEW YORK, N

HATCHING CHICKENS.

Specification of Letters Patent No. 3,019, dated Marc

To all whom it may concern:

Be it known that I, NAPOLEON E. GUERIN, of the city of New York, county and State of New York, have invented an Artificial Method of Rearing Chickens; and I do hereby declare that the following is a full and exact description.

The nature of my invention consists in a method of rearing the chickens, after the hatching of the eggs, in an oven as herein described.

Several attempts have been made to hatch eggs by artificial means, and to rear the chickens thus produced. The first of these operations has been successful, but all efforts to rear the chickens have been hitherto fruitless; from the circumstances that those who made the experiments considered the chicken as an animal which was endowed with the faculties of locomotion and of sight, and was also enabled to partake of food from the moment of its birth, and under this impression all that was necessary, or deemed so, was to protect the young birds from the inclemency of the weather, and they were accordingly kept in heated apartments without air. Although the chicken is a bird which is easily reared, since it is able to eat, as it were, at the moment it breaks its shell, still it must be admitted that there are also certain requisites which are indispensable to its existence, namely, air and heat judiciously combined. If the attempts above alluded to had been effected by men of observation, residing in the country, they would have doubtless been more successful in their undertakings, as it is extremely probable that they would have observed the method adhered to by the farmer's wife, when by some mishap a newly hatched brood of chickens are deprived of the mother who would so faithfully have watched over them; a method it may be remarked which almost invariably succeeds, they are taken by the farmer's wife and placed in a loosely woven basket, in the bottom of which some fresh straw has previously been deposited, the whole being covered with cotton or wool, after which the basket is brought near the fire, where it is left for a fortnight and there receive the heat from it. If you ask these women the motive of this mode of treating the young chicken, they will merely answer that they do not know why preference to any seen their mother and meet with si observer will at way in which the quately supplied; the chickens on them in a cool sta its parent, while of the body are w from the hen's bo the means employ to chance as to a would be impossib effectually, since air from below an

Drawing No. I. ing for the artifici sand five hundred the chicken durin existence.—A A eight divisions, fo four drawers, th placed one above contain from thre three hundred an 314). B B B B, sleep in; these are apartment, the ha on the top of the apartment. C the steam pipes for h upper part of the to support the ste of the boiler. G stream of water w of the building; th and is kept very cl renewed. The s ranges of nests is used as a yard for

Drawing No. and height of t A sectional plan, cording to the line so as to admit of B the nests under There are nine of are placed by thre heat does not bear piece of stout cot there is a red pain absorbs the heat

N. E. GUERIN.

RTIFICIAL METHOD OF REARING CHICKENS.

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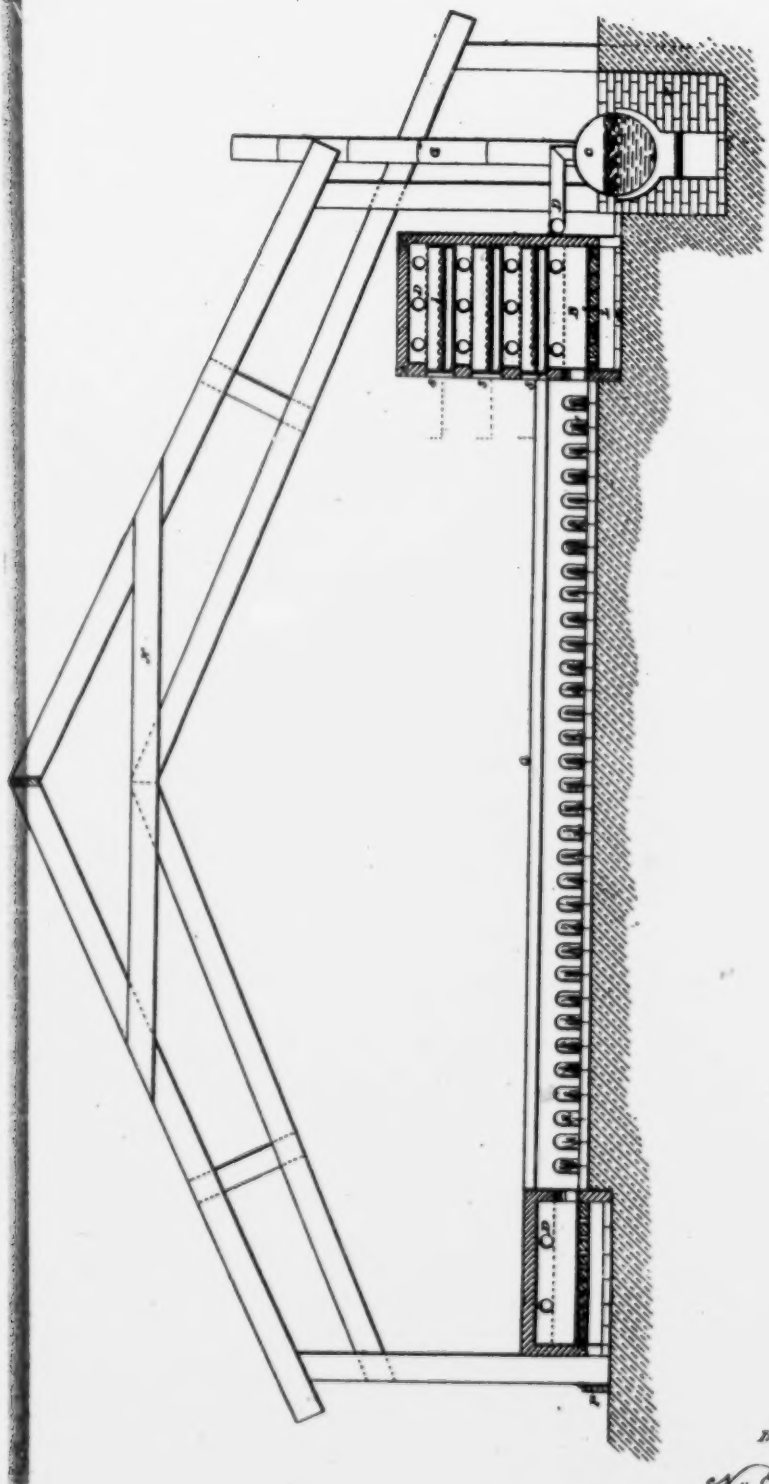

INVENTOR.

N. E. Guerin

UNITED STATES PATENT OFFICE.

NAPOLEON E. GUERIN, OF NEW YORK, N. Y.

HATCHING CHICKENS.

Specification of Letters Patent No. 3,019, dated March 30, 1843.

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Drawing No. I. Ground plan of a building for the artificial hatching of seven thousand five hundred eggs (7,500) and rearing the chicken during the first month of its existence.—A A A A, hatching oven with eight divisions, for the reception of twenty four drawers, three in each division and placed one above the other, each drawer to contain from three hundred and thirteen to three hundred and fourteen eggs (313 to 314). B B B B, nests for the chickens to sleep in; these are arranged along the whole apartment, the hatching oven being placed on the top of the nests on one side of the apartment. C the steam boiler. D D D D steam pipes for heating the oven and the upper part of the nests. E E E cross pieces to support the steam pipes. F mason work of the boiler. G, flue of the boiler. H stream of water which traverses the length of the building; this is to water the chickens and is kept very clean; it must be constantly renewed. The space between the four ranges of nests is paved with brick, and is used as a yard for the chickens.

Drawing No. II. Describes the length and height of the oven for hatching.—A sectional plan, or view of the oven according to the line O O of the ground plan, so as to admit of being seen in all its parts. B the nests under the oven. D steam pipes. There are nine of these in the oven, and they are placed by threes over each drawer; the heat does not bear directly upon the eggs; a piece of stout cotton duck is placed where there is a red painted line in the plan, which absorbs the heat at first and then gives it

out equally upon each drawer. I drawer to contain the eggs; this is divided in two parts by a mat supported by a netting whereby a vacant space is left between the eggs and the bottom of the drawer. Drawing No. III gives an explanation of this. J mat placed upon the bottom of the nests. K bottom of the nests; a number of irregular holes are bored in it, to admit fresh air to the mat where the chickens are. L conduit through which air enters from the exterior. M brick pavement of the conduit above mentioned. N woodwork of the building.

Drawing No. III. The oven for hatching viewed across, and the apartment where the chicken is kept during the first month.—The same letters refer to the same parts as those indicated in the preceding drawings. P valve to admit external air into the conduit already mentioned, and which conveys it under all the nests. It will be noticed that the holes bored in the bottom of the nests are of irregular dimensions; the smaller ones are nearer to the valve and the larger are the most distant from it; the object is to distribute the air equally under the mat. Q front view of one of the sides of the nests. R openings or doors for the ingress and egress of the chicken; these doors are concealed by split pieces of colored cotton or worsted stuffs. This arrangement allows the chicken to pass to and fro freely as it would have done under the care of the hen, by moving her feathers to one side or the other. S front view of the drawers for hatching with openings concealed as the preceding, by slit pieces of colored stuffs on a level corresponding with that of the mat. The dotted line shows the elongation added to each drawer the first day that the chickens are hatched. The black line or mark, on a level with the vacant space left between the mat and the bottom of the drawer, shows the holes which are unstopped on the same day to admit the air. The following explains this: The chicken must not be touched the first day nor even during half the second day that it is hatched. They are to remain in their respective drawers, the elongation or lengthening of the drawers forms a gallery where the young bird may take exercise, passing between the slit colored stuffs already mentioned the air which passes through the mat affords the means of respiration to those chickens who are not disposed to take exercise. The chickens become accustomed to the particular color of the stuff; they recognize it as the color of their parent. When the period has arrived for their removal from the drawers to the apartment where the nests are, they are not at a loss which nest to select, but proceed at once to that with which they have become familiarized. This shows that the color of each side of the nests must correspond to that of the drawers where the chickens were hatched.

Drawing No. IV. General plan of the buildings.—No. 1, room where the chickens are hatched and where they remain during the first month. The letters correspond to the preceding plan and point out the oven, the nests and the spot where the boiler is placed. No. 2, apartment where the chickens are kept during the second and third month; the nests are arranged around the whole room; they are no longer heated by the steam of the boiler but derive the necessary warmth from small furnaces placed at the four angles of the room, by means of which the water is heated for the steam to be conveyed by the conduits. This apartment is larger by half than room No. I and is situated to the right of room No. 1. No. 3, a similar apartment situated to the left of No. 1.

The hatching must be conducted so as to obtain a fresh brood as soon as the chickens are a month old. When they have obtained that age they are removed to the next room, in order that the newly hatched ones may occupy their place; for this purpose, sliding doors are placed Z Z and thus divide room No. 1 from Nos. 2 and 3. As soon as they are removed by this simple contrivance, the sliding door is replaced as before and the rooms are again separated. As soon as the chickens of the second hatching have remained one month in room No. 1, the sliding door is again withdrawn, but to pass them in room No. 3. The heat in the nests of No. 2 begins now to be progressively diminished and small perches are placed in the room, for many chickens at that age, prefer to roost rather than to sleep in the nests. The third set of eggs having been hatched, the chickens of No. 2 are by this time three months old, and are therefore of a proper age to be transferred to the yard with roosting places; the small perches are then removed to room No. 3, where the chickens are now two months old. The chickens of the third set of eggs are now removed to No. 2, those of the fourth set to No. 3, and so on during the year. Thus it will be seen that the chickens are not removed to the yard before they are three months old; the heat during the third month which has been gradually diminishing and the perches to which they have become accustomed enables them to bear the change or removal to the yards where they are to remain until they are sold.

X X large roosting places, built at the two ends of the building; they are divided lengthwise in two parts and the yard is similarly partitioned off so as to contain chickens of the same age, in order that when the time of selling them arrives, it may be

easy to select from any brood. Without this precaution it would be impossible to make a proper selection.

What I claim as my invention, and desire to secure by Letters Patent, is:

1. The mode of giving and distributing the heat derived from the steam pipes, as well upon the eggs in the hatching oven, as upon the chickens in the nests.

2. The plan of making the colors of the slit pieces of cotton or worsted stuff of the hatching drawers correspond with the sides of the nests in the apartments where similar slit pieces are used.

3. The elongation or lengthening of the drawers, and admitting of air at the moment the birds break their shells.

4. The mode of purifying the air under the nests by the admitting of vital air during the three first
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ests are, they are not
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h they have become
ws that the color of
each side of the nests must correspond to that of the drawers where the chickens were hatched.

Drawing No. IV. General plan of the buildings.—No. 1, room where the chickens are hatched and where they remain during the first month. The letters correspond to the preceding plan and point out the oven, the nests and the spot where the boiler is placed. No. 2, apartment where the chickens are kept during the second and third month; the nests are arranged around the whole room; they are no longer heated by the steam of the boiler but derive the necessary warmth from small furnaces placed at the four angles of the room, by means of which the water is heated for the steam to be conveyed by the conduits. This apartment is larger by half than room No. I and is situated to the right of room No. 1. No. 3, a similar apartment situated to the left of No. 1.

The hatching must be conducted so as to obtain a fresh brood as soon as the chickens are a month old. When they have obtained that age they are removed to the next room, in order that the newly hatched ones may occupy their place; for this purpose, sliding doors are placed Z Z and thus divide room No. 1 from Nos. 2 and 3. As soon as they are removed by this simple contrivance, the sliding door is replaced as before and the rooms are again separated. As soon as the chickens of the second hatching have remained one month in room No. 1, the sliding door is again withdrawn, but to pass them in room No. 3. The heat in the nests of No. 2 begins now to be progressively diminished and small perches are placed in the room, for many chickens at that age, prefer to roost rather than to sleep in the nests. The third set of eggs having been hatched, the chickens of No. 2 are by this time three months old, and are therefore of a proper age to be transferred to the yard with roosting places; the small perches are then removed to room No. 3, where the chickens are now two months old. The chickens of the third set of eggs are now removed to No. 2, those of the fourth set to No. 3, and so on during the year. Thus it will be seen that the chickens are not removed to the yard before they are three months old; the heat during the third month which has been gradually diminishing and the perches to which they have become accustomed enables them to bear the change or removal to the yards where they are to remain until they are sold.

X X large roosting places, built at the two ends of the building; they are divided lengthwise in two parts and the yard is similarly partitioned off so as to contain chickens of the same age, in order that when the time of selling them arrives, it may be

easy to select from any brood. Without this precaution it would be impossible to make a proper selection.

What I claim as my invention, and desire to secure by Letters Patent, is:

1. The mode of giving and distributing the heat derived from the steam pipes, as well upon the eggs in the hatching oven, as upon the chickens in the nests.

2. The plan of making the colors of the slit pieces of cotton or worsted stuff of the hatching drawers correspond with the sides of the nests in the apartments where similar slit pieces are used.

3. The elongation or lengthening of the drawers, and admitting of air at the moment the birds break their shells.

4. The mode of purifying the air under the nests by the admitting of vital air during the three first months of the chicken's existence and before it can live in open yards without danger.

5. The method of keeping the chickens in two apartments, one on the right and the other on the left side, of the apartment where the hatching takes place and where it may thus be continued without any interruption.

6. Finally, the drawings, the specifications and the model explain and show these new arrangements or dispositions, which have not, to my knowledge, been used or adopted in any of the countries where the artificial hatching and rearing of chickens has been attempted.

N. E. GUERIN.

In witness of—
EDW. BAYER,
LAURENCE KENNEDY.

(No Model.) 2 Sheets—Sheet 2.

758

E. H. JOHNSON.

ELECTRICAL APPARATUS FOR HEATING AND COOLING BUILDINGS.

No. 360,223. Patented Mar. 29, 1887.

Fig 2

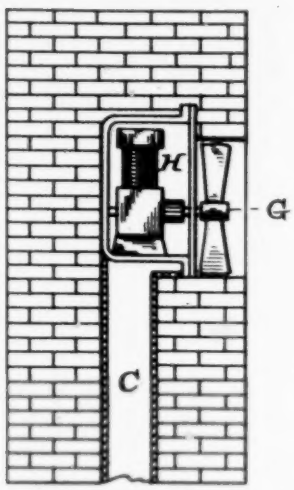


Fig 3

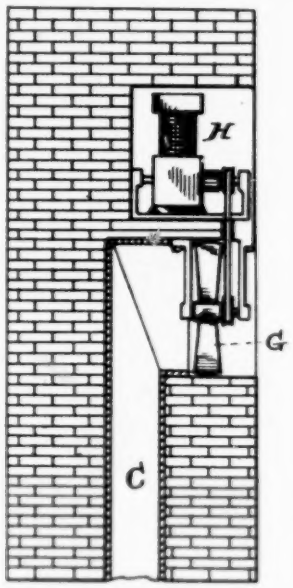


Fig 4.

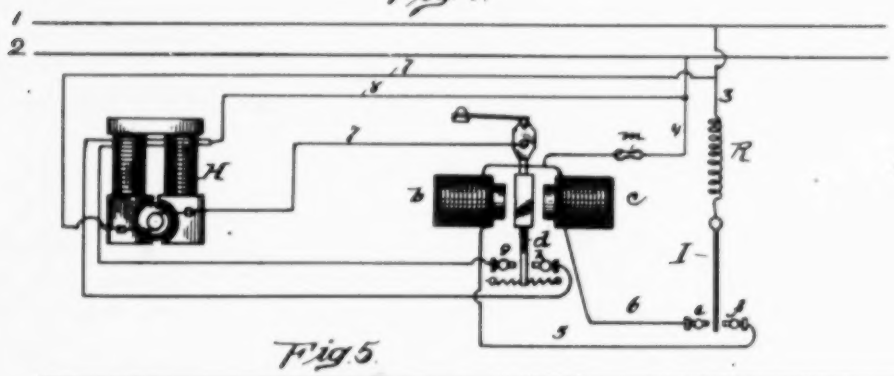


Fig 5.

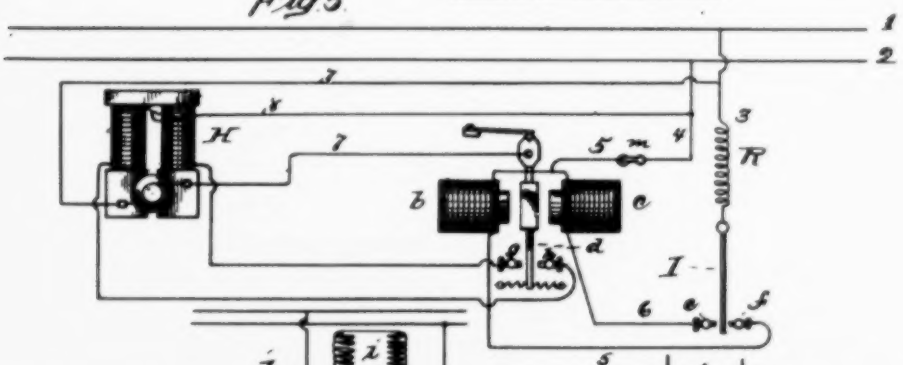
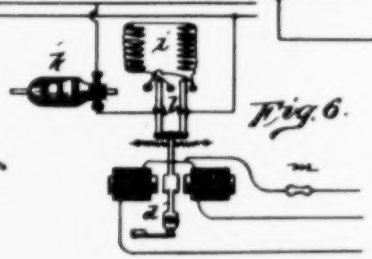


Fig 6.



ATTEST:

E. C. Rowland

Wm. Pelger

INVENTOR:

Edward H. Johnson

By Dyer & Story

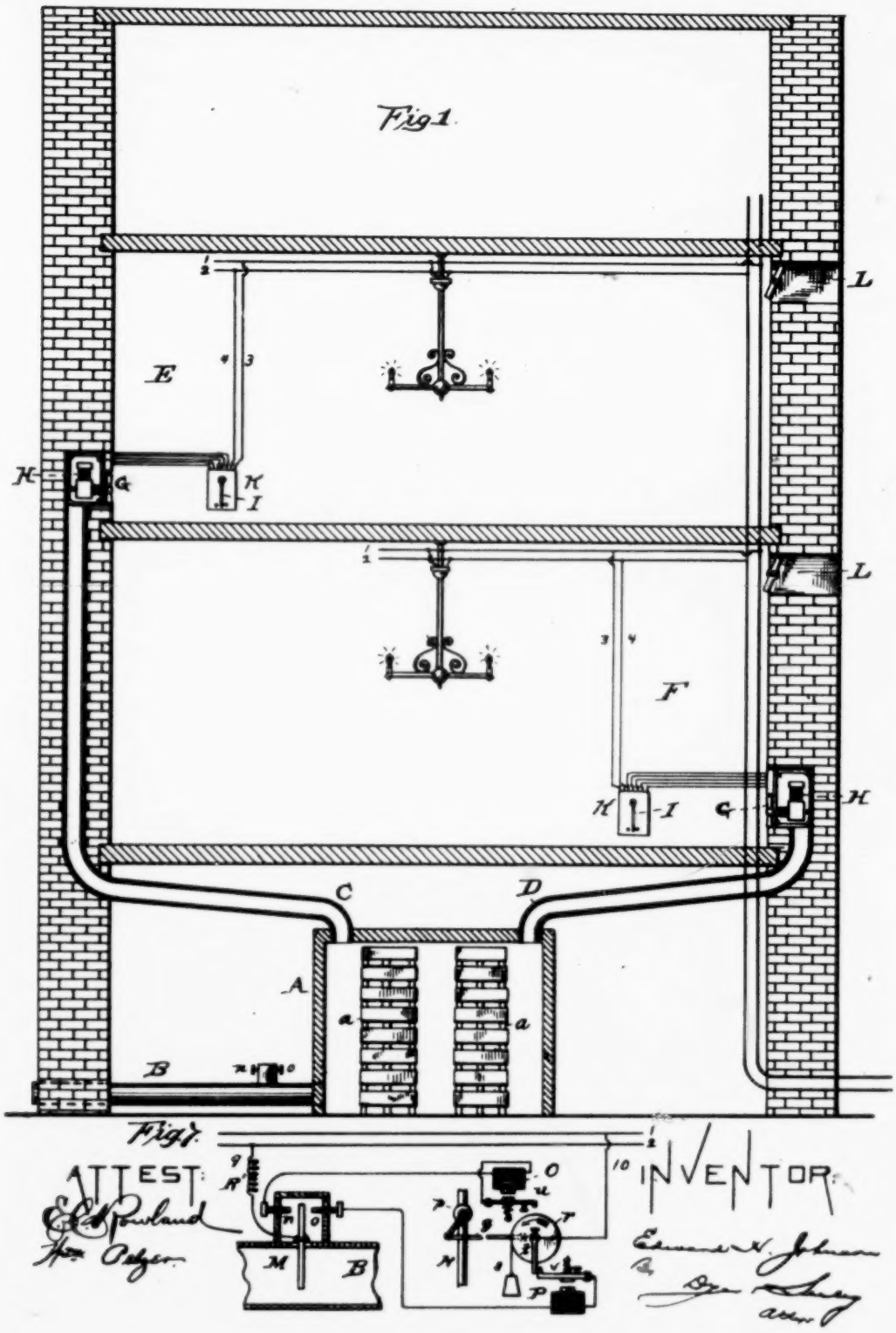
Atty

760 (No Model.) 2 Sheets—Sheet 1.

E. H. JOHNSON.

ELECTRICAL APPARATUS FOR HEATING AND COOLING BUILDINGS.

No. 360,223. Patented Mar. 29, 1887.



ATTEST:
E. C. Rowland
Wm. Odgen

INVENTOR:
Edward H. Johnson
by Dyer & Story
atty

UNITED STATES PATENT C

EDWARD H. JOHNSON, OF NEW YORK, N. Y

ELECTRICAL APPARATUS FOR HEATING AND COOLING BUILD

SPECIFICATION forming part of Letters Patent No. 360,223, dated

Application filed October 8, 1868. Serial No. 215,651. (No model.)

To all whom it may concern:

Be it known that I, EDWARD H. JOHNSON, of New York city, in the county and State of New York, have invented a certain new and useful Improvement in Apparatus for Heating and Cooling Buildings, of which the following is a specification.

The object I have in view is to produce a simple, efficient, and economical apparatus for automatically maintaining the desired temperature in the rooms of a building. The apparatus is designed to be controlled and operated electrically. It responds independently to changes in temperature in the separate rooms, floors, or other divisions of a building, and it produces a complete circulation of the heated or cooled air from one part of the building to another, so that an excess of heat or cold in one part will be utilized in other parts of the building where the opposite condition exists.

It is also designed to be economical in the use of power, to prevent waste when there is an excess of heat or cold.

In carrying out the invention I use the ordinary piping extending from the several rooms of a building to a heating or cooling chamber in the cellar, which chamber is in turn connected by a pipe with the atmosphere outside of the building for supplying fresh air to the heating or cooling chamber, from whence it is delivered to the rooms of the building. At the ends of the air-pipes where they open into the rooms are located revolving fans or blowers capable of movement in opposite directions, so that air may be caused to circulate from the pipes into the rooms or from the rooms into the pipes. Each of these fans is revolved by an electric motor, and the motor is controlled by a thermostat located in the same room.

The rooms may have ventilators connecting with the external atmosphere, or the openings such as exist around windows and doors may be depended upon to supply external air to a room when its fan is drawing air from the room and forcing it down the air-pipes. The thermostat located in the room is adjusted to maintain the temperature within certain limits. Within these limits the motor is at rest; but when either limit is reached the thermostat closes a circuit to intermediate electric apparatus, which closes the motor-circuit and causes the motor to revolve. When the thermostat assumes a central positi circuit is broken and the intermediate electric ap motor, as well as opens so that the deflection of posite directions produce of the motor and the fan building is lighted by e current for operating the trolling devices may be tric-lighting circuit at a tric-light switches, if any current will be supplied drawn from a room and f is returned to the heating the cellar, and after be cooled passes from ther to other rooms of the h or cold already stored utilized. If more air is the heating or cooling ing therefrom into the surplus will be forced o into the external atmos

A simple hand-switc each motor to prevent i

Advantage is taken travels in both directio to provide the apparat matically controlling cold to the radiators in chamber, so as to prev swinging vane is intro pipe, and by its move controls electric circu vices for controlling cold to the radiators.

In the accompanyi part hereof, Figure 1 is part of a house showin thereto; Fig. 2, a detail on a larger scale the loc at the end of an air-pip illustrating the motor and placed above the Figs. 4, 5, and 6 are vi gram, showing the co mostat, the motor, an paratus; and Fig. 7, a illustrating the device ply of heat or cold to chamber.

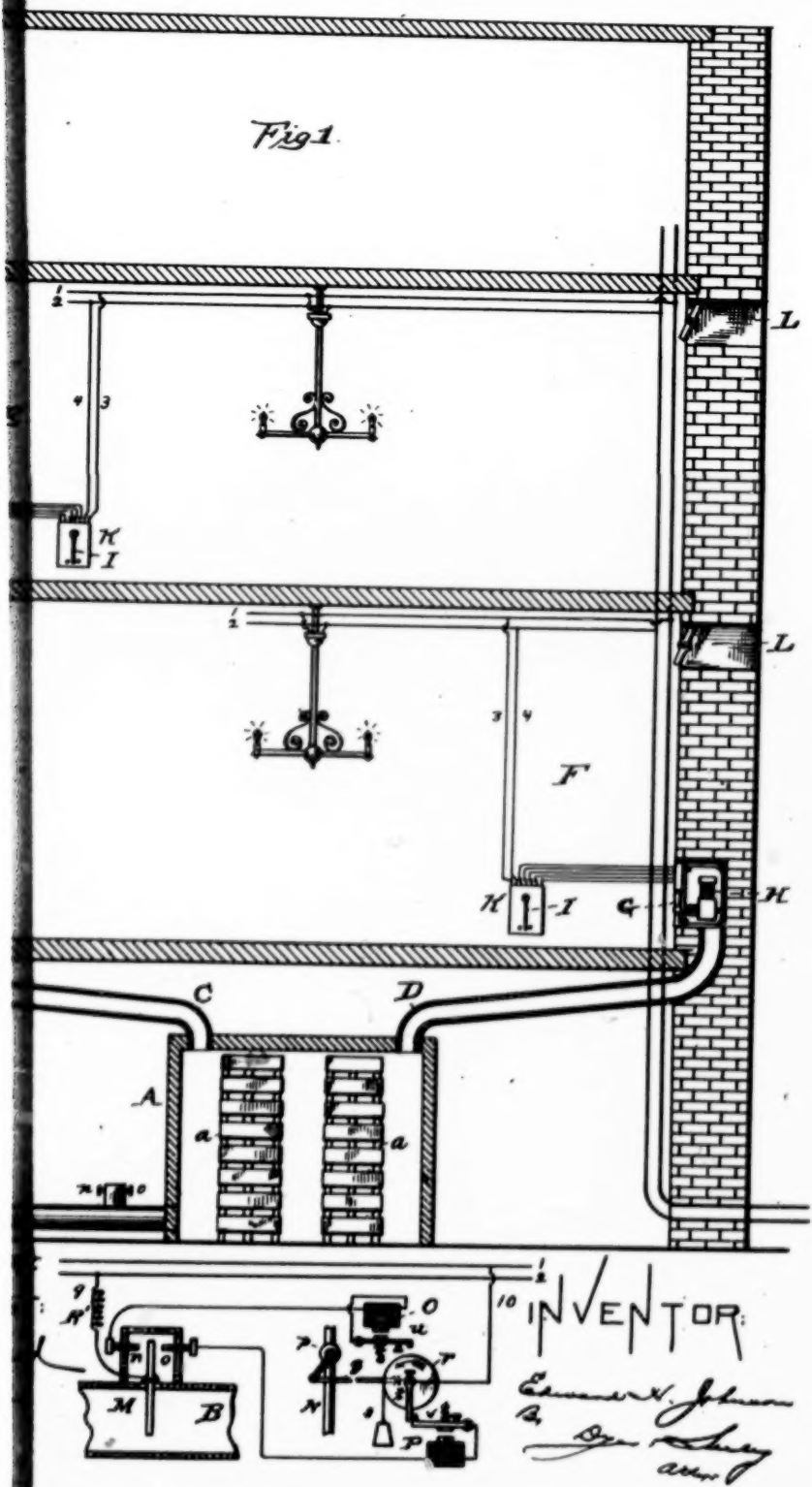
A is a heating or

2 Sheets—Sheet 1.

E. H. JOHNSON.

APPARATUS FOR HEATING AND COOLING BUILDINGS.

No. 360,383. Patented Mar. 29, 1887.



UNITED STATES PATENT OFFICE.

EDWARD H. JOHNSON, OF NEW YORK, N. Y.

ELECTRICAL APPARATUS FOR HEATING AND COOLING BUILDINGS.

SPECIFICATION forming part of Letters Patent No. 360,223, dated March 29, 1887.

Application filed October 8, 1886. Serial No. 215,651. (No model.)

To all whom it may concern:

Be it known that I, EDWARD H. JOHNSON, of New York city, in the county and State of New York, have invented a certain new and useful Improvement in Apparatus for Heating and Cooling Buildings, of which the following is a specification.

The object I have in view is to produce a simple, efficient, and economical apparatus for automatically maintaining the desired temperature in the rooms of a building. The apparatus is designed to be controlled and operated electrically. It responds independently to changes in temperature in the separate rooms, floors, or other divisions of a building, and it produces a complete circulation of the heated or cooled air from one part of the building to another, so that an excess of heat or cold in one part will be utilized in other parts of the building where the opposite condition exists.

It is also designed to be economical in the use of power, to prevent waste when there is an excess of heat or cold.

In carrying out the invention I use the ordinary piping extending from the several rooms of a building to a heating or cooling chamber in the cellar, which chamber is in turn connected by a pipe with the atmosphere outside of the building for supplying fresh air to the heating or cooling chamber, from whence it is delivered to the rooms of the building. At the ends of the air-pipes where they open into the rooms are located revolving fans or blowers capable of movement in opposite directions, so that air may be caused to circulate from the pipes into the rooms or from the rooms into the pipes. Each of these fans is revolved by an electric motor, and the motor is controlled by a thermostat located in the same room.

The rooms may have ventilators connecting with the external atmosphere, or the openings such as exist around windows and doors may be depended upon to supply external air to a room when its fan is drawing air from the room and forcing it down the air-pipes. The thermostat located in the room is adjusted to maintain the temperature within certain limits. Within these limits the motor is at rest; but when either limit is reached the thermostat closes a circuit to intermediate electric apparatus, which closes the motor-circuit and causes the motor to revolve. When the thermostat assumes a central position again, the motor-circuit is broken and the motor stopped. The intermediate electric apparatus reverses the motor, as well as opens and closes its circuit, so that the deflection of the thermostat in opposite directions produces opposite movements of the motor and the fan driven by it. If the building is lighted by electricity, the electric current for operating the motors and their controlling devices may be taken from the electric-lighting circuit at a point beyond the electric-light switches, if any are used, so that the current will be supplied at all times. The air drawn from a room and forced into the air-pipe is returned to the heating or cooling chamber in the cellar, and after being further heated or cooled passes from thence into pipes leading to other rooms of the house, so that the heat or cold already stored up in the air will be utilized. If more air is being forced back into the heating or cooling chamber than is passing therefrom into the rooms of the house, the surplus will be forced out of the fresh-air duct into the external atmosphere.

A simple hand-switch may be provided for each motor to prevent its action when desired.

Advantage is taken of the fact that the air travels in both directions in the fresh-air pipe to provide the apparatus with means for automatically controlling the supply of heat or cold to the radiators in the heating or cooling chamber, so as to prevent waste of power. A swinging vane is introduced into the fresh-air pipe, and by its movements back and forth controls electric circuits, which include devices for controlling the supply of heat or cold to the radiators.

In the accompanying drawings, forming a part hereof, Figure 1 is a sectional elevation of part of a house showing my apparatus applied thereto; Fig. 2, a detail sectional view showing on a larger scale the location of a fan and motor at the end of an air-pipe; Fig. 3, a similar view illustrating the motor separated from the fan and placed above the mouth of the air-pipe. Figs. 4, 5, and 6 are views, principally in diagram, showing the connections of the thermostat, the motor, and the intermediate apparatus; and Fig. 7, a view, partly in diagram, illustrating the devices for controlling the supply of heat or cold to the heating or cooling chamber.

A is a heating or cooling chamber or box

located in the cellar or basement of the building. It is shown as provided with radiators *a*, through which a heating medium—such as steam—or a cooling medium—such as water—may be passed; or this chamber A may be the air-chamber of a hot-air furnace. A fresh-air pipe or duct, B, leads from the chamber A to a point outside the building. From the chamber A also leads the air pipes or ducts C D, leading to the rooms E F. At the open upper end of each room-pipe is placed a revolving fan, G, which is driven by an electric motor, H, capable of revolving in opposite directions.

The motor may carry the fan directly on its shaft and be located with the fan in the open end of the pipe, as shown in Figs. 1 and 2, or the motor may be in a box above, below, or to one side of the air-pipe and be connected with the fan by an endless cord, as shown in Fig. 3.

I is the thermostat, and K is the intermediate apparatus, of which there is one of each for each motor. The intermediate apparatus in Fig. 1 is inclosed in the boxes upon which the thermostats are mounted, and in or upon which the electric connections between the thermostat and the intermediate apparatus are made. In Figs. 4 to 6 such intermediate apparatus is disclosed. It is composed of two electro magnets, *b c*, between which is a pivoted armature-lever, *d*, held normally in a central position. The thermostat is located in a circuit, 3 4, from a suitable source of electrical energy. This is preferably the electric-lighting circuit 1 2, a resistance, R, being used to reduce the flow of current. At the contacts *e f* of the thermostat the circuit 1 2 is divided into branches 5 and 6, the branch 5 including the magnet *b*, while the branch 6 includes the magnet *c*. In Figs. 4 and 5 the armature-lever *d* plays between simple contacts *g h*. From the circuit 3 4, or directly from 1 2, is taken the motor-circuit 7 8. Conductor 7 extends to the motor-armature and from thence to the pivot of the lever *d*. At the contacts *g h* this circuit is divided, the branches including oppositely-wound sections of the motor field-magnet, as in Fig. 4, or one branch including one leg of the field-magnet and the other branch the other leg, as in Fig. 5. The conductor 8 extends from the joined ends of the oppositely-wound field-magnet sections, Fig. 4, or from the field-wire when it passes from one leg to the other of the field-magnet, Fig. 5.

In Fig. 6 the field-magnet coils of the motor are shown at *i* and the motor-armature at *k*. The lever *d* is shown as working a two-arm reversing device, *l*, reversing the connections of the field-magnet coils, and also serving to make and break the entire motor-circuit. In all three instances of intermediate apparatus the motor-armature and field-magnet are located in series in the same circuit, so as to get the advantage of their combined resistance, and the motor is reversed by reversing the polarity of its field-magnet. The reversing apparatus also serves to open the motor-circuit. The peculiar intermediate apparatus shown in Figs. 4 and 5 possesses the advantage of only requiring the use of simple contact-points; but it has the disadvantage as compared with the apparatus of Fig. 6 of not bringing all the wires of the field-magnet into circuit at one time.

When a thermostat closes circuit at *e* or *f*, the magnet *b* or *c* is brought into circuit, and closes the motor-circuit with such a polarity to the field-magnet that the motor will revolve in one or the other direction, according to whether the thermostat closes on *e* or on *f*. The motor will revolve the fan, which will deliver heated or cooled air to the room or draw air from the room, the loss in the latter case being supplied through a ventilator, L, or through the openings around windows and doors. This operation will continue until the temperature is changed to the necessary extent, when the thermostat will break the circuit to the intermediate apparatus, and this, in turn, will break the motor-circuit. The air drawn from one room will be driven back into the heating or cooling chamber, and from thence distributed to other rooms or forced out of the fresh-air duct.

A simple hand-switch, *m*, Figs. 4, 5, and 6, is included in the thermostat-circuit 3 4, so that when desired the apparatus may be made inoperative by breaking the thermostat-circuit. To control the supply of heat or cold to the radiators *a* in the chamber A and prevent waste of power, advantage is taken of the fact that when there is an excess in the supply of heat or cold to the radiators air will be forced out of the fresh-air pipe B, and under the opposite conditions air will be drawn in through said pipe. A swinging vane, M, is introduced into the fresh-air pipe B, Fig. 7. When this vane hangs vertically, it stands centrally between contact-points *n o*, and out of contact with such points. The pipe N supplies the heating or cooling medium to the radiators *a*, and is provided with a cock, *p*, which is opened and closed by a pitman-bar, *q*, extending to a wheel, *r*, which wheel is turned by a clock-train, represented by the weight *s*; or any other form of motor can be employed for this purpose. An arm, *t*, on the same shaft as the wheel *r*, is intercepted by the armature-levers *u v* of two electro-magnets, O P, such armature-levers being located at diametrically-opposite points, so as to stop the wheel *r* at each half-revolution.

From the electric-lighting circuit 1 2 is taken the circuit 9 10, which passes to the pivot of vane M and extends in two branches from the contact-screws *n o* to the magnets O P, from thence to the armature-levers *u v* of such magnets, and then by a common return from the shaft of wheel *r* to the other side of the circuit 1 2. A resistance, R', may be included in the circuit 9 10, if desired. The cock *p* is shown as open. When the vane M is swung by an

outflowing current of air, it makes contact at *o* and closes circuit to the magnet P, which releases the wheel *r*, and this wheel turns until the arm *t* is intercepted by the lever *s* of the magnet O. This half-revolution of the wheel draws the pitman to the other side of the wheel and closes the cock, cutting off the supply of the heating or cooling medium to the radiators *a*. When the vane swings in the other direction, it will make contact at *n* and close circuit to the magnet O, when the wheel *r* will be again released, opening the cock *p*, and the parts will again assume the position shown. By extending the circuits of the magnets O P through their armature-levers the circuit to each magnet can be completed only when the revolving arm *t* is in contact with its armature-levers. Hence, each magnet has its circuit broken as soon as it releases the arm *t*, and a waste of current is prevented. The vane M can be made as sensitive as desired by constructing the part above the pivot of nearly the same weight as the part below the pivot, and by properly proportioning the relative weight of these parts the precise action desired can be secured; or a balanced revolving vane could be used, if desired.

What I claim is—

1. The combination, with an air pipe, duct, or flue delivering air to a room in a building, of a fan or blower located within said pipe, an electric motor operating the same, and a thermostat controlling such motor, substantially as set forth.

2. The combination, with an air pipe, duct, or flue delivering air to a room in a building, of a fan or blower located within said pipe, an electric motor operating the same, an intermediate electric apparatus directly controlling the motor-circuit, and a thermostat opening and closing circuit to such intermediate apparatus, substantially as set forth.

3. The combination, with an air pipe, duct, or flue delivering hot or cold air to a room, of a fan or blower located within such pipe and capable of reverse movements, so as to force air into or draw it from the room, and devices controlled by changes in temperature in the room and acting to work such fan or blower in opposite directions, substantially as set forth.

4. The combination, with two or more air pipes, ducts, or flues extending to different rooms of a building, and a common hot or cold air-chamber from which such pipes extend, of a fan or blower located within each of such pipes and capable of reverse movements, so as to force air into or draw it from the room, and devices for each fan controlled by changes in temperature and acting to work such fan or blower in opposite directions, substantially as set forth.

5. The combination, with an air pipe, duct, or flue delivering hot or cold air to a room, of a fan or blower within such pipe capable of movement in opposite directions, an electric motor driving such fan, an intermediate circuit controlling and reversing apparatus for such motor, and a therm
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This specification si
6th day of October. 18

ED

Witnesses:
RICHD. N. DY
WM. PELZER.

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A simple hand-switch, *m*, Figs. 4, 5, and 6, is included in the thermostat-circuit 3 4, so that when desired the apparatus may be made inoperative by breaking the thermostat-circuit. To control the supply of heat or cold to the radiators *a* in the chamber A and prevent waste of power, advantage is taken of the fact that when there is an excess in the supply of heat or cold to the radiators air will be forced out of the fresh-air pipe B, and under the opposite conditions air will be drawn in through said pipe. A swinging vane, M, is introduced into the fresh-air pipe B, Fig. 7. When this vane hangs vertically, it stands centrally between contact-points *n o*, and out of contact with such points. The pipe N supplies the heating or cooling medium to the radiators *a*, and is provided with a cock, *p*, which is opened and closed by a pitman-bar, *q*, extending to a wheel, *r*, which wheel is turned by a clock-train, represented by the weight *s*; or any other form of motor can be employed for this purpose. An arm, *l*, on the same shaft as the wheel *r*, is intercepted by the armature-levers *n e* of two electro-magnets, O P, such armature-levers being located at diametrically-opposite points, so as to stop the wheel *r* at each half-revolution.

From the electric-lighting circuit 1 2 is taken the circuit 9 10, which passes to the pivot of vane M and extends in two branches from the contact-screws *n o* to the magnets O P, from thence to the armature-levers *n e* of such magnets, and then by a common return from the shaft of wheel *r* to the other side of the circuit 1 2. A resistance, R', may be included in the circuit 9 10, if desired. The cock *p* is shown as open. When the vane M is swung by an

outflowing current of air, it makes contact at *o* and closes circuit to the magnet P, which releases the wheel *r*, and this wheel turns until the arm *t* is intercepted by the lever *s* of the magnet O. This half-revolution of the wheel draws the pitman to the other side of the wheel and closes the cock, cutting off the supply of the heating or cooling medium to the radiators *a*. When the vane swings in the other direction, it will make contact at *n* and close circuit to the magnet O, when the wheel *r* will be again released, opening the cock *p*, and the parts will again assume the position shown. By extending the circuits of the magnets O P through their armature-levers the circuit to each magnet can be completed only when the revolving arm *t* is in contact with its armature-levers. Hence, each magnet has its circuit broken as soon as it releases the arm *t*, and a waste of current is prevented. The vane M can be made as sensitive as desired by constructing the part above the pivot of nearly the same weight as the part below the pivot, and by properly proportioning the relative weight of these parts the precise action desired can be secured; or a balanced revolving vane could be used, if desired.

What I claim is—

1. The combination, with an air pipe, duct, or flue delivering air to a room in a building, of a fan or blower located within said pipe, an electric motor operating the same, and a thermostat controlling such motor, substantially as set forth.

2. The combination, with an air pipe, duct, or flue delivering air to a room in a building, of a fan or blower located within said pipe, an electric motor operating the same, an intermediate electric apparatus directly controlling the motor-circuit, and a thermostat opening and closing circuit to such intermediate apparatus, substantially as set forth.

3. The combination, with an air pipe, duct, or flue delivering hot or cold air to a room, of a fan or blower located within such pipe and capable of reverse movements, so as to force air into or draw it from the room, and devices controlled by changes in temperature in the room and acting to work such fan or blower in opposite directions, substantially as set forth.

4. The combination, with two or more air pipes, ducts, or flues extending to different rooms of a building, and a common hot or cold air-chamber from which such pipes extend, of a fan or blower located within each of such pipes and capable of reverse movements, so as to force air into or draw it from the room, and devices for each fan controlled by changes in temperature and acting to work such fan or blower in opposite directions, substantially as set forth.

5. The combination, with an air pipe, duct, or flue delivering hot or cold air to a room, of a fan or blower within such pipe capable of movement in opposite directions, an electric motor driving such fan, an intermediate circuit controlling and reversing apparatus for such motor, and a thermostat controlling the circuit to such intermediate apparatus, substantially as set forth.

6. The combination, with the temperature-maintaining fan, of the electric motor driving the same, and having its armature and field-magnet coils in series, an intermediate electric apparatus acting to make and break the motor-circuit and to reverse the connections of its field-magnet coils, and the thermostat controlling the circuit of the intermediate apparatus, substantially as set forth.

7. The combination, with the temperature-maintaining fan, the electric motor, the intermediate apparatus, and the thermostat, of an electric lighting circuit, and connections therefrom to such devices, substantially as set forth.

8. The combination, with the temperature-maintaining fan, the electric motor, the intermediate apparatus, the thermostat, and electric connections for supplying such devices with current for automatic operation, of a hand-switch for rendering said devices inoperative, substantially as set forth.

9. The combination, with a heating or cooling chamber, air-pipes leading therefrom to the rooms of the building, and a fresh-air pipe leading to such chamber and having a vane moved by the air currents in such pipe, of means controlled by the air currents in such fresh-air pipe and acting to control the supply of the heating or cooling medium to such chamber, substantially as set forth.

10. The combination, with a heating or cooling chamber, air-pipes leading therefrom to the rooms of the building, thermostatically-controlled motors operating fans which act to force air into or draw it from the rooms, and a fresh-air pipe leading to such chamber and having a vane moved by the air-currents in such pipe, of means controlled by the air-currents in such fresh-air pipe and acting to control the supply of the heating or cooling medium to such chamber, substantially as set forth.

11. The combination, with the heating or cooling chamber and the fresh-air pipe, of the moving vane in such pipe, a valve controlling the supply of the heating or cooling medium to such chamber, and electric connections controlled by the vane for operating such valve, substantially as set forth.

12. The combination, with the fresh-air pipe, the vane therein, and the valve-operating wheel revolved by a motor, of the revolving stop-arm, and the two electro-magnets having their circuits extending through their armatures and said revolving stop-arm, whereby the circuit of each magnet will be opened after releasing such stop-arm, substantially as set forth.

This specification signed and witnessed this 6th day of October, 1896.

EDWD. H. JOHNSON.

Witnesses:
RICHD. N. DYER,
WM. PELZER.

(No Model.) 2 Sheets—Sheet 2.

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J. K. PROCTOR & J. H. KNOWLES.

DRYING MACHINE.

No. 426,321. Patented Apr. 22, 1890.

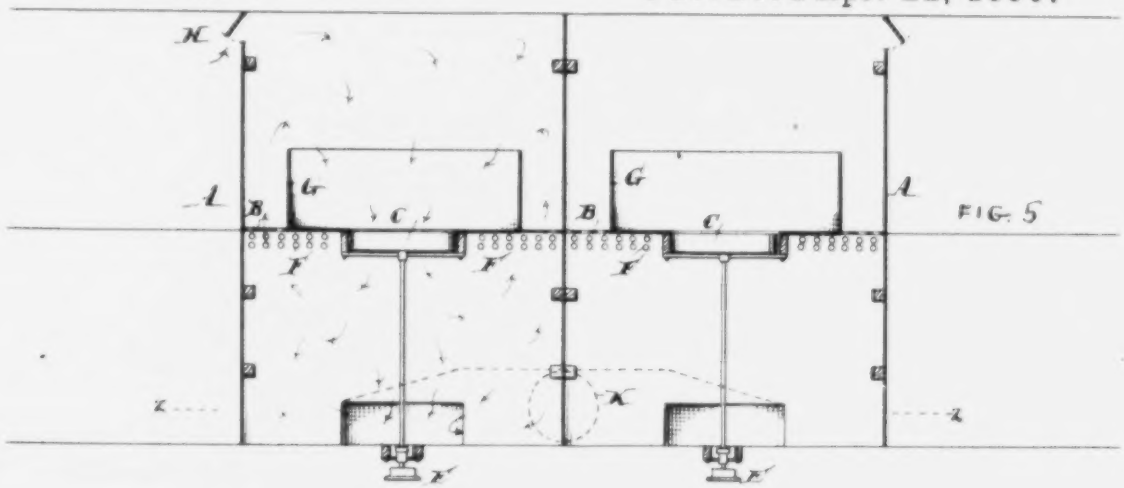

FIG. 5

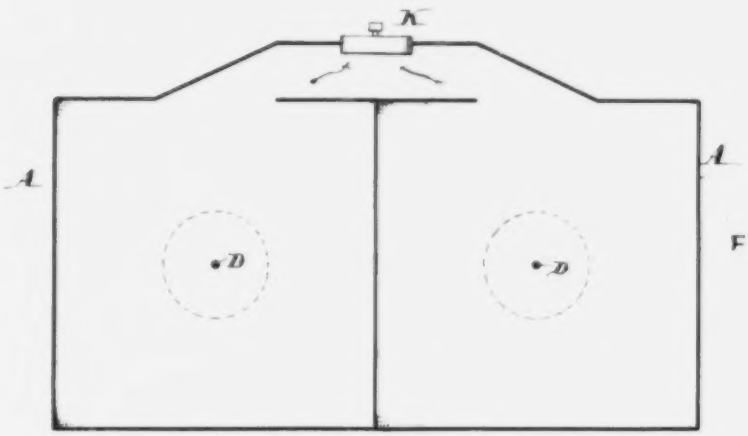

FIG. 6

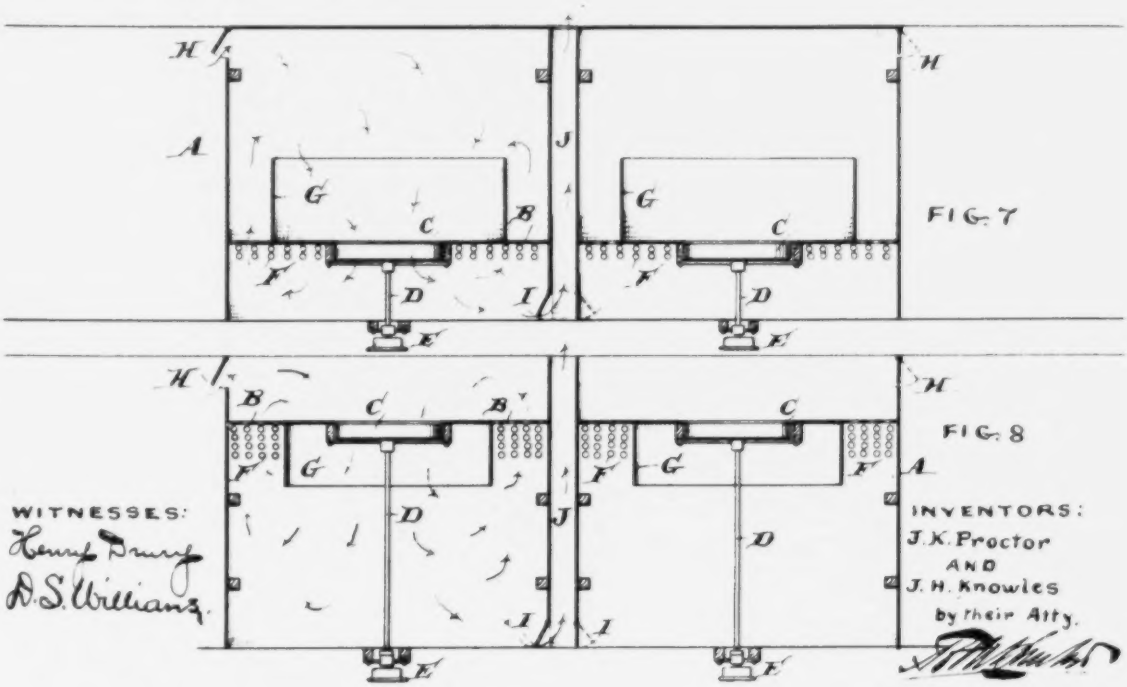

FIG. 7

FIG. 8

WITNESSES:
Henry Drury
D. S. Williams.

INVENTORS:
J. K. Proctor
AND
J. H. Knowles
by their Atty.

(No Model.) 2 Sheets—Sheet 1.

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J. K. PROCTOR & J. H. KNOWLES.

DRYING MACHINE.

No. 426,321. Patented Apr. 22, 1890.

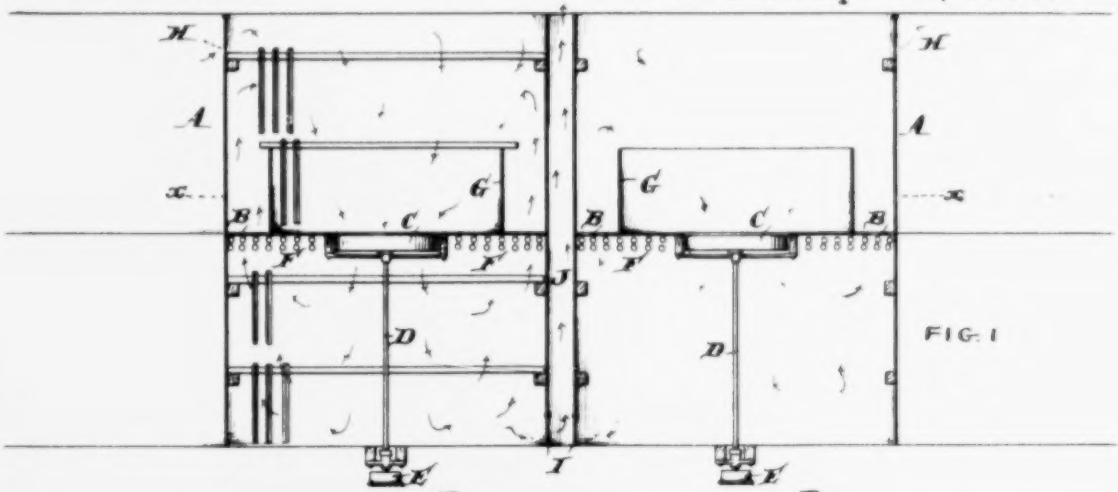

FIG. 1

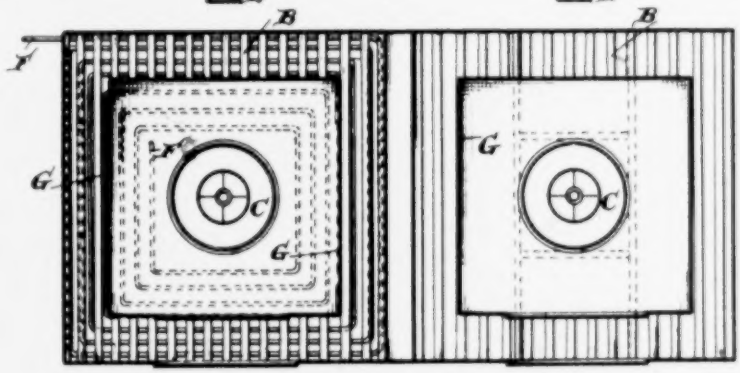

FIG. 2

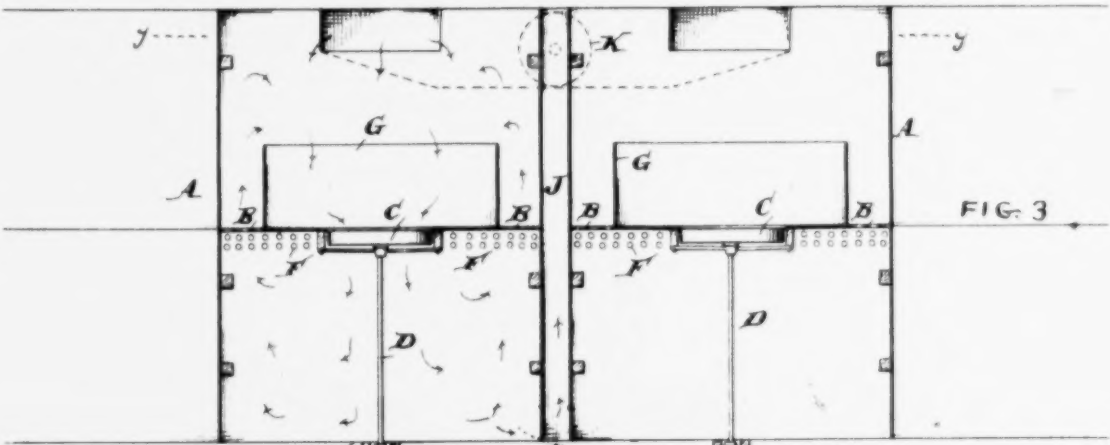

FIG. 3

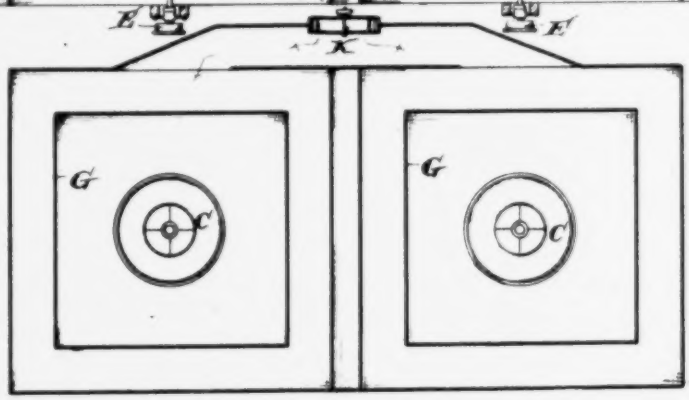

FIG. 4

WITNESSES:
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D. S. Williams

INVENTORS:
J. K. Proctor
AND
J. H. Knowles
by their Atty.

UNITED STATES PATENT

JOSIAH K. PROCTOR AND JOHN HENRY KNOWLES, OF PHIL
SYLVANIA, ASSIGNORS TO THE PHILADELPHIA TEX
COMPANY, OF SAME PLACE.

DRYING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 426,321, dated

Application filed January 19, 1889. Serial No. 296,827. (No model.)

To all whom it may concern.

Be it known that we, JOSIAH K. PROCTOR and JOHN HENRY KNOWLES, of the city and county of Philadelphia, and State of Pennsylvania, have invented an Improvement in Drying-Machines, of which the following is a specification.

Our invention relates to drying-machines; and it consists of certain improvements, all of which are fully set forth in the following specification and shown in the accompanying drawings, which form part thereof.

More particularly our invention relates to that class of drying apparatus in which the air is forced or drawn through or among the material to be dried by means of air forcing or exhausting mechanism.

It is the object of our invention to cause an even distribution of the air as it is moved through the drying-room among the material and to heat it in the drying-room itself, so that there shall be no waste of heat from direct radiation. The material to be dried may be arranged loosely in layers or on racks or screens, or hung on hooks, poles, or other hanging devices; but whatever be the arrangement of the material, it must be such as to allow the free passage of the air through it, and should be so distributed through the room as to provide numerous air-spaces.

In the drawings, Figure 1 is a longitudinal vertical section of a pair of our improved drying-rooms. Fig. 2 is a horizontal sectional view through the line $x\ x$ of Fig. 1. Figs. 3 and 5 are longitudinal vertical sections of drying-rooms, showing modifications of our invention. Figs. 4 and 6 are horizontal sectional views of the same through the lines $y\ y$ of Fig. 3 and $z\ z$ of Fig. 5, respectively, and Figs. 7 and 8 are longitudinal sectional views of other modified forms of our improved drying-rooms.

In all the figures the same letters of reference refer to similar parts, and the arrows show the direction of the air-currents.

Although the drawings show two drying-rooms side by side, we will first proceed with our description as if there were but one room, since each room is like the other in every detail, and afterward speal
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2 Sheets—Sheet 1.

K. PROCTOR & J. H. KNOWLES.

DRYING MACHINE.

Patented Apr. 22, 1890.

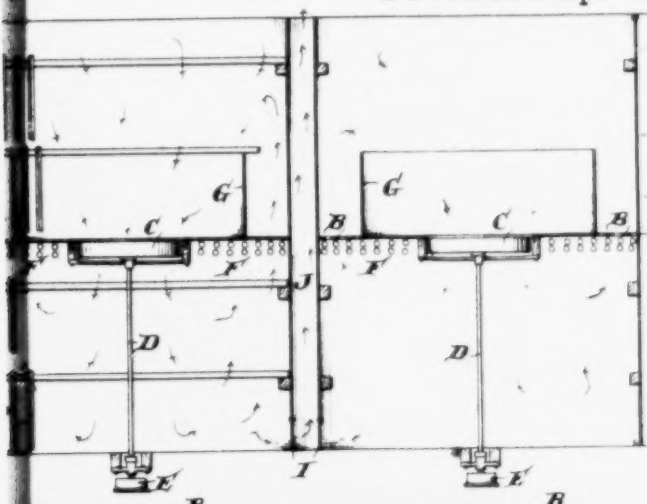

FIG. 1

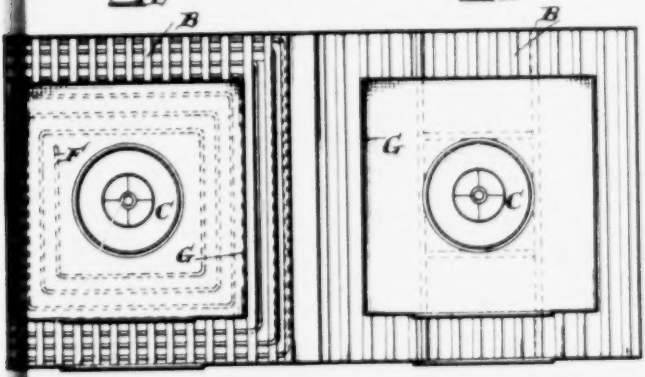

FIG. 2

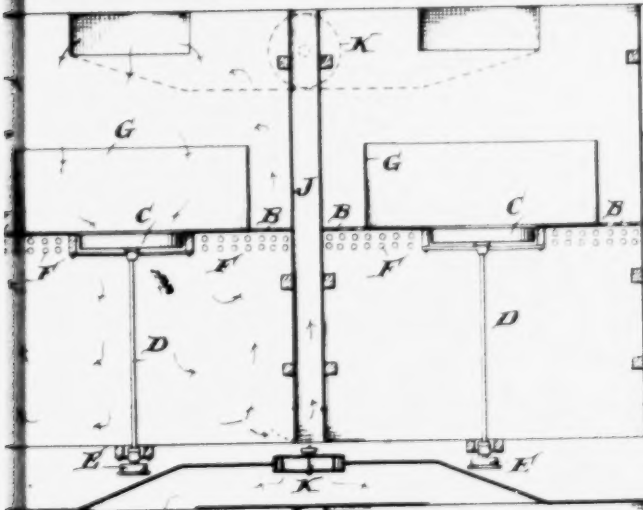

FIG. 3

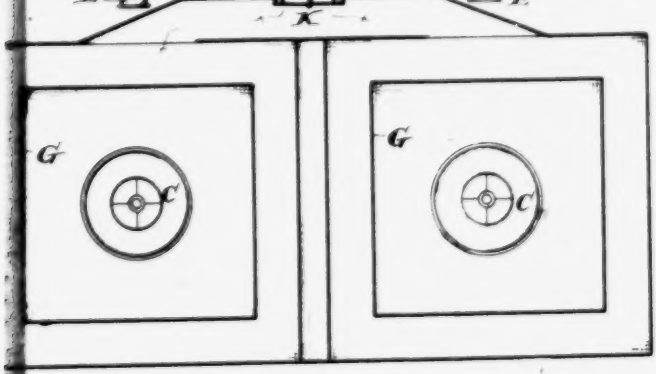

FIG. 4

INVENTORS:
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AND
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by their Atty.

UNITED STATES PATENT OFFICE.

JOSIAH K. PROCTOR AND JOHN HENRY KNOWLES, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO THE PHILADELPHIA TEXTILE MACHINERY COMPANY, OF SAME PLACE.

DRYING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 426,321, dated April 22, 1890.

Application filed January 19, 1889. Serial No. 296,827. (No model.)

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Our invention relates to drying-machines; and it consists of certain improvements, all of which are fully set forth in the following specification and shown in the accompanying drawings, which form part thereof.

More particularly our invention relates to that class of drying apparatus in which the air is forced or drawn through or among the material to be dried by means of air forcing or exhausting mechanism.

It is the object of our invention to cause an even distribution of the air as it is moved through the drying-room among the material and to heat it in the drying-room itself, so that there shall be no waste of heat from direct radiation. The material to be dried may be arranged loosely in layers or on racks or screens, or hung on hooks, poles, or other hanging devices; but whatever be the arrangement of the material, it must be such as to allow the free passage of the air through it, and should be so distributed through the room as to provide numerous air-spaces.

In the drawings, Figure 1 is a longitudinal vertical section of a pair of our improved drying-rooms. Fig. 2 is a horizontal sectional view through the line *x x* of Fig. 1. Figs. 3 and 5 are longitudinal vertical sections of drying-rooms, showing modifications of our invention. Figs. 4 and 6 are horizontal sectional views of the same through the lines *y y* of Fig. 3 and *z z* of Fig. 5, respectively, and Figs. 7 and 8 are longitudinal sectional views of other modified forms of our improved drying-rooms.

In all the figures the same letters of reference refer to similar parts, and the arrows show the direction of the air-currents.

Although the drawings show two drying-rooms side by side, we will first proceed with our description as if there were but one room, since each room is like the other in every detail, and afterward speak of the relation which the two rooms have to one another.

A is the drying-room, which we prefer to construct square in cross-section, but of a greater height than width. It is provided with a suitable door, through which it may be entered by the workman.

B is a central floor, which divides the room into upper and lower compartments. The room in practice preferably occupies two floors of a building, each compartment of the room being of sufficient height for a workman to enter and work comfortably therein.

C is a fan for circulating the air in the room, having a shaft D, bearing the pulley E, for supporting and driving the fan.

F are steam-heating coils placed just below the central floor B in the upper part of the lower compartment of the drying-room. These coils preferably run around the entire square of the room, as shown in the left-hand portion of Fig. 2, and are furnished with suitable supply and outlet pipes.

Extending upward from the floor B, inside of the upper compartment of the drying-room, is an inclosure or funnel G, down which the air passes to the fan C. This funnel extends upward about one-third of the height from the floor B to the top of the drying-room, and is preferably formed rectangular with four walls, though it may be formed in any suitable shape in cross-section. Within this funnel the floor B is continuous, except that it is provided with a suitable opening leading to the fan. Outside of the funnel and between it and the four walls of the drying-room the floor B is provided with numerous openings communicating between the lower and upper compartments. In the drawings these openings are shown as formed by constructing the floor of slats, leaving continuous spaces between them; but the shape of the openings is obviously immaterial, provided they furnish sufficient aggregate area for the free circulation of the air from one compartment to the other. The slatted floor also serves as a support for the operator in handling the goods in the upper compartment of the drying-room.

H and I are respectively an inlet and outlet air-passage, which are provided with suitable doors or gates.

The operation of the apparatus in drying yarn or other material is as follows: The doors H and I are closed, and the air driven by the fan C is impelled downward through and among the material until it reaches the bottom, where, finding no outlet, it circulates upward around the four sides and corners of the room and passes through the openings in the floor B to the upper compartment, taking with it heat from the steam-coils F, through a portion of which it is compelled to pass. After passing through the floor B the air ascends upward to the top of the drying-room, whence it is drawn downward through the funnel G by the fan C. The general direction of the air-currents in the various parts of the drying-room may be clearly understood from the arrows in Fig. 1. The funnel G serves the purpose of giving direction to the circulation by compelling the air which otherwise would pass in currents just over the floor B directly to the fan to pass outside of the funnel to the top of the room. The air as it thus circulates passes through and among the material to be dried in every part of the room, becoming rapidly heated and absorbing the moisture from the damp goods. The doors H and I may now be opened to admit a supply of fresh dry air through the former and to permit the hot damp air to escape from the latter, and by a proper adjustment of these doors the temperature and humidity of the air in the drying-room may be regulated and increased or diminished, as desired. When the drying of the material is completed, the doors H and I are fully opened and the steam is shut off from the coil. The fan C soon drives out all the extra heat from the room, rendering the temperature therein comfortable to work in. If desired, during the whole process of taking the goods out and recharging the drier the fan C may be kept running, preferably at a slower speed than usual, so as to produce a grateful temperature to work in. In summer-time such a circulation of air during the recharging of the room is extremely pleasant and desirable. In some cases the doors H and I may be dispensed with, leaving an open inlet and outlet, through which a continued and uniform passage of air may be maintained.

In the drawings we have shown two drying-rooms adjoining one another, with a common passage or flue J, into which each of the drying-rooms empties its discharging currents. The ascending column of heated air in the flue J produces a suction at the bottom of the flue on the principle of atmospheric equilibrium, as in chimneys, and to this extent assists in removing the discharge from the drying-rooms. Of course the flue J could be built by the side of a single drying-room instead of being placed between two drying-rooms; but the method as shown is an economical arrangement where more than one drying-room is required to do the work. The flue J is not absolutely necessary to the successful working of the apparatus, but is a desirable adjunct to it.

Instead of depending entirely on the fan C and flue J for the discharge of the waste air from the drying-room, we sometimes force the air out by a second fan K, placed specially for that purpose. In Figs. 3 and 4 this fan is placed at the top and forces the air into the drying-rooms just under the top of the room, where it is mingled with the downward current through the funnels or flues G. When this special fan is thus placed at the top of the drier, the opening H is not used, the only opening into the top of the drying-rooms being from the special fan, and the discharge is forced out at the openings I by the combined pressures produced by the said special fan and the fan C.

In Figs. 5 and 6 the special fan K is placed at the bottom of the drying-rooms and sucks the discharge out. When thus placed, the openings I are not used, the only opening from the bottom being that leading to the special fan, and the discharge is effected by the combined efforts of the forcing-fan C and the special sucking-fan K. It will be observed that when this special fan is placed at the bottom no waste-flue J need be employed, and none is shown in Figs. 5 and 6; but whether this special fan is placed at the top or the bottom of the drier, the openings into the drying-rooms from or to the fan may be controlled by suitable doors or gates, and one fan will suffice for two adjoining rooms by having communicating passages from the fan to the rooms, as shown in the drawings.

The steam-coils F, while preferably placed as shown in the drawings, may be placed in any other convenient position inside of the drier—as, for instance, over the floor B, or in the bottom of the room just over the lower floor. The funnel or flue C may be continued downward and below the floor B to any desired depth for the purpose of guiding the downward currents. Instead of a fan such as shown in the drawings for moving the air, any other suitable air-moving devices may be employed.

Where on account of the lack of vertical height in the building in which our drier may have to be located, or where it may be necessary to dry only a small quantity of goods at one time, we construct these driers with but a single compartment for the goods, the second compartment in this case becoming a mere air chamber or passage. In Figs. 7 and 8 the air-chamber thus formed is shown placed at the bottom and top of the drier, respectively.

While we prefer the construction here shown, it is apparent that the mere details may be varied in many ways without depart-

ing from the principle of our invention, and are therefore not to be considered limitations of it.

We are aware of the Patent No. 263,013, granted to Blodgett for oven for baking, cooking, or drying by employing the difference in specific gravity in air of different temperatures to induce circulation, and do not claim anything therein set out or claimed.

Having now described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. A drying-room provided with a partition dividing it into upper and lower compartments, in combination with the funnel or flue G, supported upon said partition, said partition having a series of perforations in its surface outside of said funnel between the funnel and walls of the compartments, and being closed within the funnel except at its center, which is provided with an opening, and the fan C, located at said opening to cause the air in circulating through the room to pass through the funnel or flue, the said funnel or flue inclosing relatively a much larger space than that occupied by the fan and adapted to contain goods to be treated, and the said partition acting as a floor for the operator both inside and outside of the funnel.

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Witnesses:
SAMUEL W.
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Instead of depending entirely on the fan C and flue J for the discharge of the waste air from the drying-room, we sometimes force the air out by a second fan K, placed specially for that purpose. In Figs. 3 and 4 this fan is placed at the top and forces the air into the drying-rooms just under the top of the room, where it is mingled with the downward current through the funnels or flues G. When this special fan is thus placed at the top of the drier, the opening H is not used, the only opening into the top of the drying-rooms being from the special fan, and the discharge is forced out at the openings I by the combined pressures produced by the said special fan and the fan C.

In Figs. 5 and 6 the special fan K is placed at the bottom of the drying-rooms and sucks the discharge out. When thus placed, the openings I are not used, the only opening from the bottom being that leading to the special fan, and the discharge is effected by the combined efforts of the forcing-fan C and the special sucking-fan K. It will be observed that when this special fan is placed at the bottom no waste-flue J need be employed, and none is shown in Figs. 5 and 6; but whether this special fan is placed at the top or the bottom of the drier, the openings into the drying-rooms from or to the fan may be controlled by suitable doors or gates, and one fan will suffice for two adjoining rooms by having communicating passages from the fan to the rooms, as shown in the drawings.

The steam-coils F, while preferably placed as shown in the drawings, may be placed in any other convenient position inside of the drier—as, for instance, over the floor B, or in the bottom of the room just over the lower floor. The funnel or flue C may be continued downward and below the floor B to any desired depth for the purpose of guiding the downward currents. Instead of a fan such as shown in the drawings for moving the air, any other suitable air-moving devices may be employed.

Where on account of the lack of vertical height in the building in which our drier may have to be located, or where it may be necessary to dry only a small quantity of goods at one time, we construct these driers with but a single compartment for the goods, the second compartment in this case becoming a mere air chamber or passage. In Figs. 7 and 8 the air-chamber thus formed is shown placed at the bottom and top of the drier, respectively.

While we prefer the construction here shown, it is apparent that the mere details may be varied in many ways without depart-

ing from the principle of our invention, and are therefore not to be considered limitations of it.

We are aware of the Patent No. 263,013, granted to Blodgett for oven for baking, cooking, or drying by employing the difference in specific gravity in air of different temperatures to induce circulation, and do not claim anything therein set out or claimed.

Having now described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. A drying-room provided with a partition dividing it into upper and lower compartments, in combination with the funnel or flue G, supported upon said partition, said partition having a series of perforations in its surface outside of said funnel between the funnel and walls of the compartments, and being closed within the funnel except at its center, which is provided with an opening, and the fan C, located at said opening to cause the air in circulating through the room to pass through the funnel or flue, the said funnel or flue inclosing relatively a much larger space than that occupied by the fan and adapted to contain goods to be treated, and the said partition acting as a floor for the operator both inside and outside of the funnel.

2. A drying-room provided with a partition dividing it into upper and lower compartments, in combination with the funnel or flue G, supported upon said partition, said partition having a series of perforations in its surface outside of said funnel between the funnel and walls of the compartments, and being closed within the funnel except at its center, which is provided with an opening, and the fan C, located at said opening to cause the air in circulating through the room to pass through the funnel or flue, the said funnel or flue inclosing relatively a much larger space than that occupied by the fan and adapted to contain goods to be treated, and the said partition acting as a floor for the operator both inside and outside of the funnel, and steam-pipes within one of said compartments close to the partition, among which the air in circulating is caused to pass.

In testimony of which invention we hereunto set our hands.

JOSIAH K. PROCTOR.
JOHN HENRY KNOWLES.

Witnesses:
SAMUEL W. THACKRAH,
WALTER A. KREIDER.

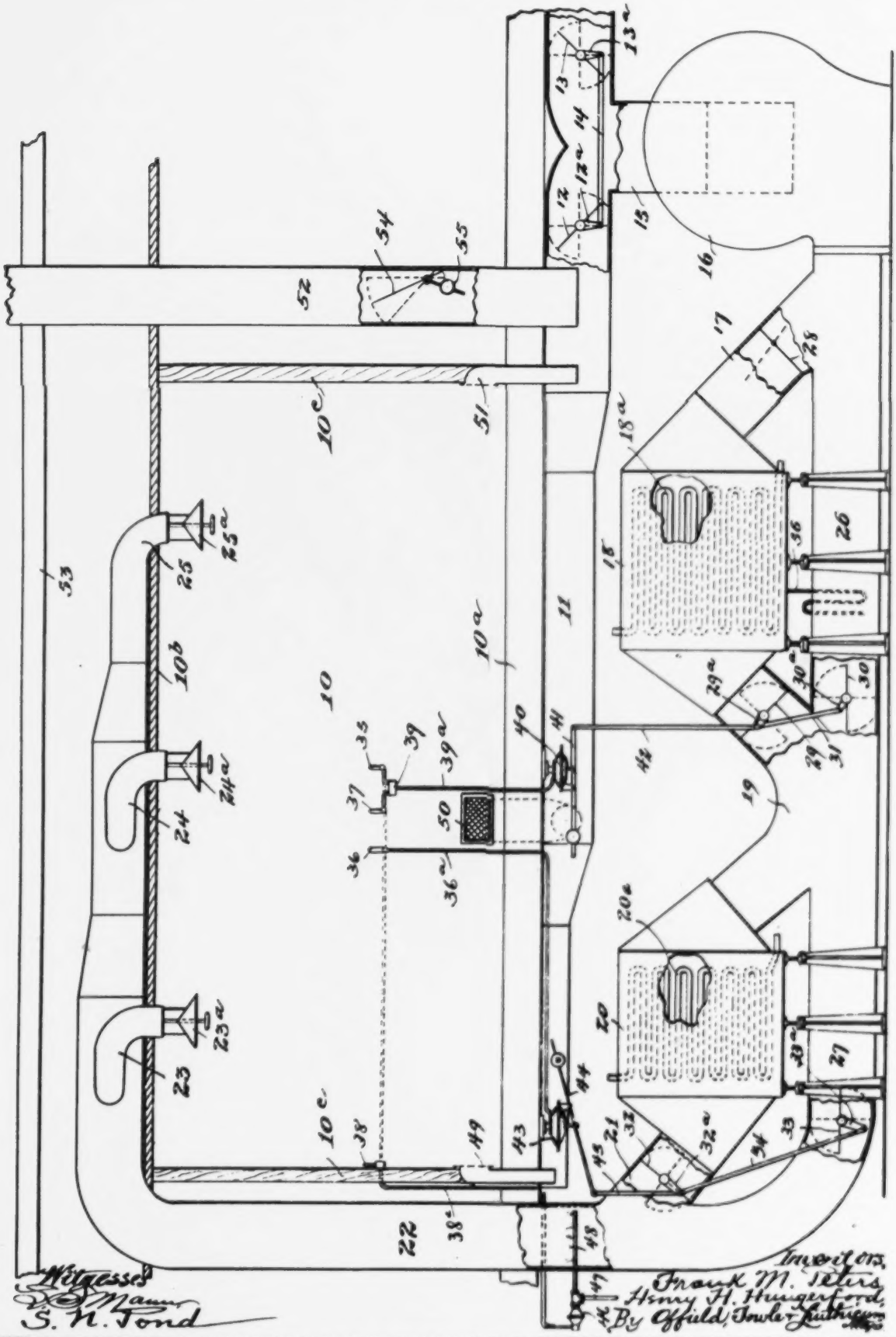
774

No. 843,909. PATENTED FEB. 12, 1907.

F. M. PETERS & H. H. HUNGERFORD.

ATMOSPHERE REGULATING SYSTEM.

APPLICATION FILED JUNE 8, 1903.



Witnesses:
S. Mann
S. N. Pond

Inventors:
Frank M. Peters,
Henry H. Hungerford,
By Offield, Towler & Lothrop
Attys.

UNITED STATES PATENT

FRANK M. PETERS AND HENRY H. HUNGERFORD, C
SAID HUNGERFORD ASSIGNOR TO SAI

ATMOSPHERE-REGULATING SYST

No. 843,909. Specification of Letters Patent.

Application filed June 8, 1903. Serial No. 160,620.

To all whom it may concern:

Be it known that we, FRANK M. PETERS and HENRY H. HUNGERFORD, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Atmosphere-Regulating Systems, of which the following is a specification.

Our invention relates to improvements in systems and devices for regulating atmospheric conditions, and more particularly to a system which includes as features thereof means for controlling and regulating the temperature, the humidity, and the ventilation, any or all, of the room or chamber subjected to the influence of the apparatus.

Experience has shown that in bakeries, breweries, and similar establishments certain processes of manufacture or certain steps therein require a more or less protracted maintenance of atmospheric conditions of substantial uniformity as regards temperature, humidity, and ventilation, or any or all of these conditions, while in school-houses, hospitals, theaters, and the like it is also desirable and advantageous, for a variety of reasons, to maintain substantial uniformity of such atmospheric conditions.

In carrying out our invention we employ means for maintaining a circulation of air through a room or chamber, which means are regulable to maintain a constant flow of fresh air, a flow of fresh air in association with air that has already passed through the apartment, or a continuous circulation and reuse of the same or substantially the same body of air, and in connection therewith we employ thermostatically and humidostatically controlled agencies for maintaining substantially constant a desired character or condition of the air circulated with reference to its temperature and humidity.

Our invention is graphically shown in the accompanying drawing, which represents in diagrammatic form the various agencies employed in carrying out our invention and their relation to each other.

Referring to the drawing, 10 may represent a room or apartment designed to be controlled as to its atmospheric condition.

10^a may represent the floor, 10^b the ceiling, and 10^c the side and end walls, of the apartment 10. Directly beneath the floor 10^a is an air return and vent duct 11, one end of which (the right- leads to the exter the duct being co pers 12 and 13, th nected to operate 13^a, respectively, The air-duct 11 b 12 and 13 is tapp a fan or blower, (charge side of s thereto a pipe-sec or cylinder 18, co coils, (indicated curved pipe exte box or cylinder heating-coils, (in short section 21 conduit pipe 22, l the apartment an said pipe termina branches 23, 24, the ceiling, said being provided w 25^a, respectively, volume of air disc and likewise to th fuse the same.

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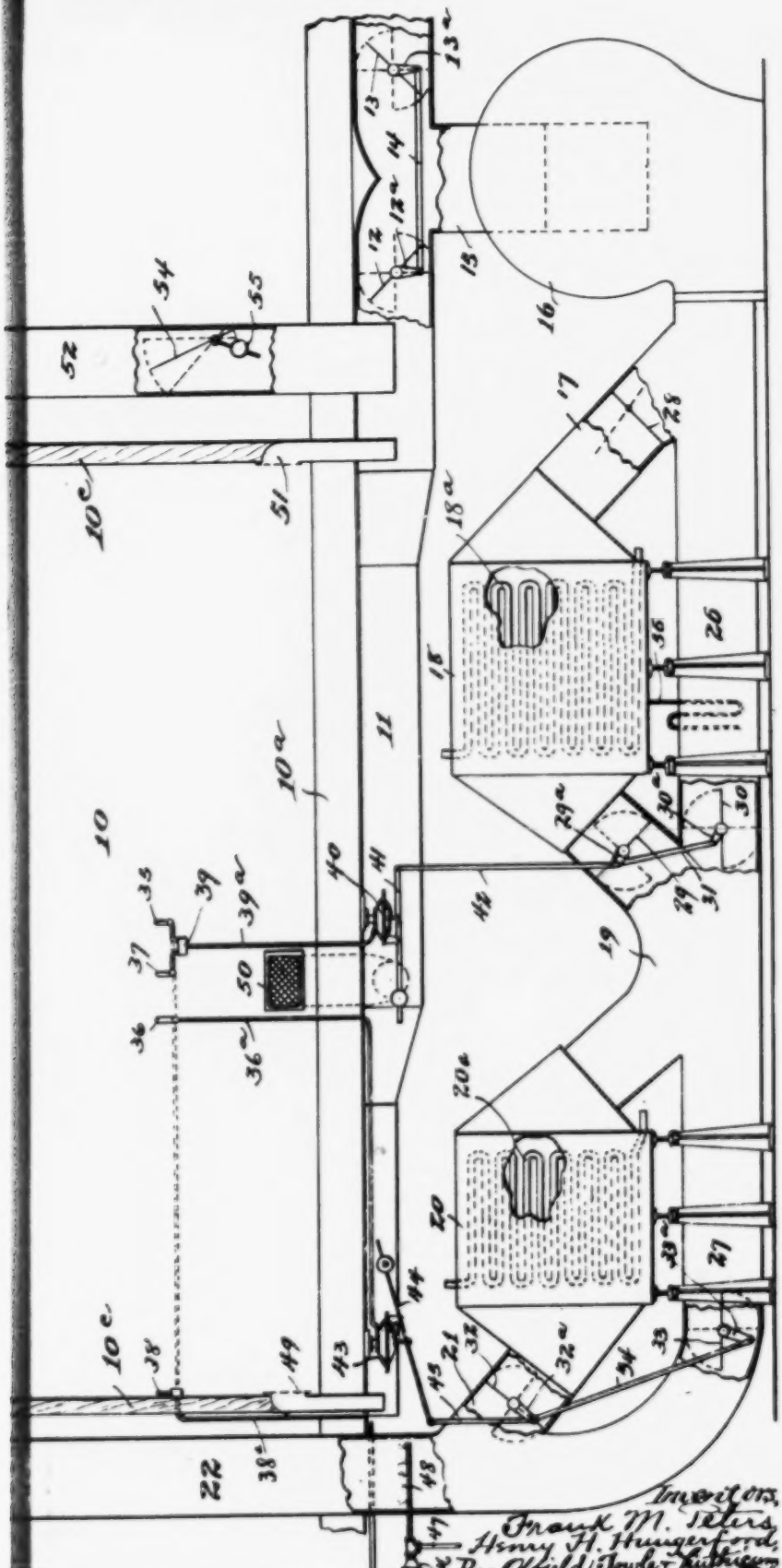
PATENTED FEB. 12, 1907.

M. PETERS & H. H. HUNGERFORD.

MOSPHERE REGULATING SYSTEM.

APPLICATION FILED JUNE 8, 1903.



UNITED STATES PATENT OFFICE.

FRANK M. PETERS AND HENRY H. HUNGERFORD, OF CHICAGO, ILLINOIS; SAID HUNGERFORD ASSIGNOR TO SAID PETERS.

ATMOSPHERE-REGULATING SYSTEM.

No. 843,909. Specification of Letters Patent. Patented Feb. 12, 1907.

Application filed June 8, 1903. Serial No. 160,620.

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Experience has shown that in bakeries, breweries, and similar establishments certain processes of manufacture or certain steps therein require a more or less protracted maintenance of atmospheric conditions of substantial uniformity as regards temperature, humidity, and ventilation, or any or all of these conditions, while in school-houses, hospitals, theaters, and the like it is also desirable and advantageous, for a variety of reasons, to maintain substantial uniformity of such atmospheric conditions.

In carrying out our invention we employ means for maintaining a circulation of air through a room or chamber, which means are regulable to maintain a constant flow of fresh air, a flow of fresh air in association with air that has already passed through the apartment, or a continuous circulation and reuse of the same or substantially the same body of air, and in connection therewith we employ thermostatically and humidostatically controlled agencies for maintaining substantially constant a desired character or condition of the air circulated with reference to its temperature and humidity.

Our invention is graphically shown in the accompanying drawing, which represents in diagrammatic form the various agencies employed in carrying out our invention and their relation to each other.

Referring to the drawing, 10 may represent a room or apartment designed to be controlled as to its atmospheric condition.

10^a may represent the floor, 10^b the ceiling, and 10^c the side and end walls, of the apartment 10. Directly beneath the floor 10^a is an air return and vent duct 11, one end of which (the right-hand end as herein shown) leads to the external atmosphere, such end of the duct being controlled by a pair of dampers 12 and 13, the spindles of which are connected to operate in unison by arms 12^a and 13^a, respectively, and a connecting-rod 14. The air-duct 11 between the damper-valves 12 and 13 is tapped by the intake-duct 15 of a fan or blower, (indicated at 16.) The discharge side of said blower has connected thereto a pipe-section 17, leading into a box or cylinder 18, containing a series of cooling-coils, (indicated at 18^a,) whence a second curved pipe extension 19 leads into a second box or cylinder 20, containing a series of heating-coils, (indicated at 20^a,) whence a short section 21 communicates with an air-conduit pipe 22, leading up behind one end of the apartment and above the ceiling thereof, said pipe terminating in a group of discharge branches 23, 24, and 25, depending through the ceiling, said discharge-pipes preferably being provided with deflectors 23^a, 24^a, and 25^a, respectively, designed to regulate the volume of air discharged into the apartment and likewise to thoroughly disperse and diffuse the same.

Between the pipe-sections 17 and 19 is a by-pass 26 around the air-cooler 18, and between the sections 19 and the junction of the sections 21 and 22 is a second by-pass 27 around the air-heater 20. In the pipe-section 17 is interposed a balanced valve or damper 28, which is normally closed except when the current of air is to be directed through the cooler 18, while the adjacent ends of the section 19 and by-pass 26 are provided with damper-valves 29 and 30, respectively, the spindles of which are connected to operate in unison by arms 29^a and 30^a and a connecting-link 31 and so set that when either is wide open the other is closed. Similarly, in the pipe 21 and by-pass 27 are interposed damper-valves 32 and 33, respectively, the spindles of which are connected to operate in unison by arms 32^a and 33^a and a connecting-rod 34, said valves also being so set that when one is fully opened the other is closed.

In the apartment 10 are suitably located a pair of thermostats, the exposed parts of which are indicated at 35 and 36, and a pair of humidostats, the exposed parts of which are indicated at 37 and 38. The thermostat

35 and humidostat 37 may operate through a cumulative controller (indicated at 39) and a pressure-pipe 39^a on a diaphragm-chamber 40, the diaphragm of which latter is connected, through a counterweighted lever 41 and link 42, with the rod 31, connecting the damper-valves 29 and 30. The thermostat 36 is similarly connected, through its pressure-pipe 36^a, diaphragm-chamber 43, a counterweighted lever 44, and link 45, with the rod 34, connecting the damper-valves 32 and 33. The humidostat 38, through its pressure-pipe 38^a and valve 46, governs the admission of a steam-jet through a pipe 47 and nozzle 48, which enters the air-conduit at any suitable point between the air-blower and the chamber, said nozzle being herein shown as penetrating the lower end of the section 22 in such a manner as to discharge the steam-vapor directly into the current of air traveling therethrough.

The outlet for the air in the apartment 10 is provided for by one or more flues 49, 50, and 51, opening through the inner surfaces of the side and end walls of the apartment and leading thence through the floor into the return and vent duct 11. A vent-pipe 52 at its lower end taps the duct 11 inwardly of the innermost damper-valve 12, said pipe extending through the ceiling of the apartment and through the superposed roof of the building, (indicated at 53.) At any suitable point in the vent-pipe 52 is placed a balanced damper-valve 54, the counterweight 55 of which is so arranged as to normally maintain the valve closed, but permit it to open more or less, accordingly as the return-passage for the air to the fan is closed or opened. The cooler box or cylinder has tapping its bottom a trapped discharge-pipe 56 for a purpose hereinafter described.

The operation of our improved system of atmosphere regulation is substantially as follows: Assuming that the damper-valves 12 and 13 are so set as to close the valve 12 and open wide the valve 13 and the fan having been set in operation, a current of fresh air from outside is drawn into and forced through the fan. Assuming that this air is at or substantially at the predetermined temperature desired within the apartment 10 to which the thermostats have been set, the latter will so operate as to maintain closed the valves 29 and 32 and maintain open the valves 30 and 33, under which condition of the apparatus the current will flow directly through the by-passes 26 and 27, the section 22, and the discharge-sections 23, 24, and 25 into the chamber 10, the air passing thence through the discharge-flues 49, 50, and 51 into the return and vent duct 11, whence the current rises and passes off through the vent-pipe 52, the force of the current being sufficient to swing the balanced valve 54 open sufficiently to permit its passage. If, however, the air drawn from outside through the fan exceeds the desired temperature limit of the chamber 10, the thermostat indicated at 35 promptly reverses the dampers 29 30, thus causing the current of air from the blower to pass through the cooler 18, the closing of the damper 30 creating sufficient pressure to open the balanced valve 28 and permit the flow of air past the same. If, on the other hand, the air from outside is cooler than is desired to be maintained in the chamber 10, the thermostat indicated at 36 acts to reverse the valves 32 and 33, thereby causing a current of air emerging from the by-pass 26 to travel through the heater 20. By means of the steam-pipe 47 and jet 48 a supply of aqueous vapor may be furnished to the current of air on its way to the apartment, and if the incoming air proves to be too dry or if its travel through the cooler 18 has extracted too much of the humidity therefrom the current of air can be moistened to the required degree by this means, which is controlled by the humidostat 38 acting, through its valve 46, to admit the supply of steam-vapor. If, on the other hand, the entering air contains an undue percentage of moisture, the humidostat 37 acts on the valves or dampers 29 and 30 to direct the air-current through the cooler 18, by which the moisture in the air is partially or wholly condensed, the deposited moisture being drained off through the pipe 56. Should this operation have the effect of too greatly cooling the air, the thermostat 36 will act at the same time upon the valves 32 and 33 to direct the dried cold current of air through the heater 20.

The thermostat 35 and humidostat 37 control independent valves that admit compressed air through the pipe 39^a to the diaphragm-chamber 40. If the conditions in the chamber 10 are too hot and too moist, both valves will open, admitting compressed air cumulatively to the diaphragm-chamber, and thereby shifting the dampers to direct the incoming air through the cooler, which is also a condenser and extracts the moisture. If the conditions in chamber 10 are too cold and too dry, neither the thermostat 35 nor the humidostat 37 will act, but these conditions will be regulated by the thermostat 36 and the humidostat 38. If the air in chamber 10 is too hot, but hygroscopically correct, the thermostat 35 alone will act, the humidostat 37 being idle. On the other hand, if the air in the chamber 10 is too moist, but of correct temperature, the humidostat 37 will act and the thermostat 35 will be idle. It will thus be seen that the thermostat 35 and humidostat 37 control only the positive conditions of temperature and humidity, while the negative conditions are controlled by the other pair 36 and 38. In other words, one of the thermostats controls the rising and the other the falling of the temperature rela-

tively to a given point or degree, while, similarly, one of the humidostats controls the increase and the other the decrease of humidity relatively to a given point or percentage of the same. There is no interference in the action of these parts, since the humidostat of either pair will promptly act to correct any change of hygroscopic conditions incidentally created by the action of the thermostat of the other pair, and vice versa.

Under some conditions it is feasible and practicable in order to a void the necessity of either heating or cooling a stream of air constantly flowing from the outside to maintain a closed circulation of the air in the apartment, and this may readily be done by reversing the valves 12 and 13, to open the former and close the latter. In this case the air-current discharged from the apartment through the return-duct 11 is obviously reconveyed to the inlet-pipe of the blower and forced thence to and through the circulation-pipes and the apartment in a continuous and closed circuit. In this case, there being no pressure on the valve 54 in the vent 52, this valve automatically closes and prevents the induction of external air through said vent. In still other circumstances it may be feasible and desirable to maintain in part a closed circuit, permitting the introduction, however, of a certain proportion of external air. For this purpose the valves 12 and 13 may be set partially open to any desired extent or degree, as shown by the full lines in the drawing, in which case the blower draws in air from both the return and vent duct 11 and from the outer atmosphere, a certain portion of the air discharged from the apartment rising through the vent 52.

From the foregoing it will be seen that our invention provides a system of ventilation which not only maintains a constant and uniform flow of air through an apartment or storage-chamber and a consequent constant change of the air therein, but may also provide for the maintenance of constant and uniform thermal or hygroscopic conditions, or both, within said apartment, irrespective of such conditions prevailing outside. Obviously for the preservation of goods and materials susceptible to deterioration and injury through thermal and hygroscopic changes a system such as our invention provides fills an important place. Similarly, in hospitals, school-houses, theaters, or other inclosed places or apartments where a great number of persons may congregate or where it is essential for the comfort and health of human beings to have perfectly-controlled atmospheric conditions such conditions may be insured by the employment of the apparatus or system herein shown.

It is evident that numerous changes and modifications, particularly in the relative detail arrangement of the air-forcing device, the air-conduits, the moistener, and other system, might be em ing from the spirit tages of the inventio limit ourselves to t tion or relative arran of the system as except to the exten claims.

We claim—

1. In an atmospher rooms, the combinat device and a conduit charge side thereof t the room, of an air-h conduit, a by-pass air-cooler also interp by-pass around said thermostatically-oper control the passage of said heater and cool by-passes respectivel perature in the room erating when the ma when the minimum attained, substantiall

2. In an atmospher rooms, the combinati device and a conduit charge side thereof to the room, of an air-co conduit, a by-pass aro heater also interposed pass around said he operated means servi sage of the air-curren and cooler and their the temperature in t statically-controlled control the passage of said cooler, substantia

3. In an atmospher rooms, the combinati device and a conduit charge side thereof to the room, of a moistur in said conduit, a by- denser, and means ope located in the room se current through said pass, substantially as

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tively to a given point or degree, while, similarly, one of the humidostats controls the increase and the other the decrease of humidity relatively to a given point or percentage of the same. There is no interference in the action of these parts, since the humidostat of either pair will promptly act to correct any change of hygroscopic conditions incidentally created by the action of the thermostat of the other pair, and vice versa.

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From the foregoing it will be seen that our invention provides a system of ventilation which not only maintains a constant and uniform flow of air through an apartment or storage-chamber and a consequent constant change of the air therein, but may also provide for the maintenance of constant and uniform thermal or hygroscopic conditions, or both, within said apartment, irrespective of such conditions prevailing outside. Obviously for the preservation of goods and materials susceptible to deterioration and injury through thermal and hygroscopic changes a system such as our invention provides fills an important place. Similarly, in hospitals, school-houses, theaters, or other inclosed places or apartments where a great number of persons may congregate or where it is essential for the comfort and health of human beings to have perfectly-controlled atmospheric conditions such conditions may be insured by the employment of the apparatus or system herein shown.

It is evident that numerous changes and modifications, particularly in the relative detail arrangement of the air-forcing device, the air-conduits, the heater, the cooler, the moistener, and other appurtenances of the system, might be employed without departing from the spirit or lessening the advantages of the invention, and hence we do not limit ourselves to the particular construction or relative arrangement of the elements of the system as shown and described, except to the extent indicated in specific claims.

We claim—

1. In an atmosphere-regulating system for rooms, the combination with an air-forcing device and a conduit extending from the discharge side thereof to and through a wall of the room, of an air-heater interposed in said conduit, a by-pass around said heater, an air-cooler also interposed in said conduit, a by-pass around said cooler, and separate thermostatically-operated means serving to control the passage of the air-current through said heater and cooler and their respective by-passes respectively according to the temperature in the room, one of said means operating when the maximum and the other when the minimum desired temperature is attained, substantially as described.

2. In an atmosphere-regulating system for rooms, the combination with an air-forcing device and a conduit extending from the discharge side thereof to and through a wall of the room, of an air-cooler interposed in said conduit, a by-pass around said cooler, an air-heater also interposed in said conduit, a by-pass around said heater, thermostatically-operated means serving to control the passage of the air-current through said heater and cooler and their by-passes according to the temperature in the room, and humidostatically-controlled means also serving to control the passage of the air-current through said cooler, substantially as described.

3. In an atmosphere-regulating system for rooms, the combination with an air-forcing device and a conduit extending from the discharge side thereof to and through a wall of the room, of a moisture-condenser interposed in said conduit, a by-pass around said condenser, and means operated by a humidostat located in the room serving to direct the air-current through said condenser or said by-pass, substantially as described.

4. In an atmosphere-regulating system for rooms, the combination with an air-forcing device and a conduit extending from the discharge side thereof to and through a wall of the room, of a moisture-condenser interposed in said conduit, a by-pass around said condenser, means operated by a humidostat located in the room serving to direct the air-current through said condenser when the humidity of the air in the room exceeds a predetermined point, a vapor-injector interposed in said conduit, and means operated by the humidostat located in the room serving

778 to admit vapor through said injector when the humidity of the air in the room falls below a predetermined point, substantially as described.

5. In an atmosphere-regulating system designed to maintain substantially constant temperature and humidity conditions in a room, the combination with an air conduit or circuit in which the room is interposed, of an air-forcing device in said conduit, air heating and cooling means also interposed in said conduit, valve-controlled by-passes around the same, thermostatically-controlled means for controlling the engagement of the circulating current with said heating and cooling means, and humidostatically-controlled means for injecting steam or other vapor into the circulating air-current, substantially as described.

6. In an atmosphere-regulating system designed to maintain substantially constant temperature and humidity conditions in a room, as well as to control the ventilation thereof, the combination with an air conduit or circuit in which the room is interposed, of an air-forcing device in said conduit, air heating and cooling means also interposed in said circuit, valve-controlled by-passes around the same, thermostatically-controlled means for controlling the engagement of the circulating current with said heating and cooling means, humidostatically-controlled means for controlling the engagement of the circulating current with said cooling means, and other humidostatically-controlled means for extracting moisture from said air-current, air inlet and outlet passages also communicating with said circuit, and means whereby the circuit may be maintained open, closed, or partially opened and closed relatively to the outer air, substantially as described.

7. In an atmosphere-regulating system for rooms, the combination with an air conduit or circuit in which the room is interposed, of an air-forcing device in said circuit, the intake member of said air-forcing device having means whereby it may be connected wholly with the circuit or wholly with the external atmosphere, or partially with both, air heating and cooling means interposed in said circuit, valve-controlled by-passes around the same, separate thermostatically-controlled means for controlling the engagement of the circulating current with said heating and cooling means respectively, and a vent-pipe tapping said conduit between the room and the air-forcing device, substantially as described.

FRANK M. PETERS.
HENRY H. HUNGERFORD.

Witnesses:
FREDERICK C. GOODWIN.
SAMUEL N. POND.

914 (Defendants' Exhibit P, Letters Patent No. J. Wiebe, May 16, 1911.)

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lly-controlled means for controlling the engagement of the circulating current with said cooling means, and other humidostatically-controlled means for extracting moisture from said air-current, air inlet and outlet passages also communicating with said circuit, and means whereby the circuit may be maintained open, closed, or partially opened and closed relatively to the outer air, substantially as described.

7. In an atmosphere-regulating system for rooms, the combination with an air conduit or circuit in which the room is interposed, of an air-forcing device in said circuit, the intake member of said air-forcing device having means whereby it may be connected wholly with the circuit or wholly with the external atmosphere, or partially with both, air heating and cooling means interposed in said circuit, valve-controlled by-passes around the same, separate thermostatically-controlled means for controlling the engagement of the circulating current with said heating and cooling means respectively, and a vent-pipe tapping said conduit between the room and the air-forcing device, substantially as described.

FRANK M. PETERS.
HENRY H. HUNGERFORD.

Witnesses:
FREDERICK C. GOODWIN.
SAMUEL N. POND.

914 (Defendants' Exhibit P, Letters Patent No. 992,622 to J. Wiebe, May 16, 1911.)

J. WIEBE.

EGG DRIER.

APPLICATION FILED OCT. 18, 1910.

780

992,622.

Patented May 16, 1911.

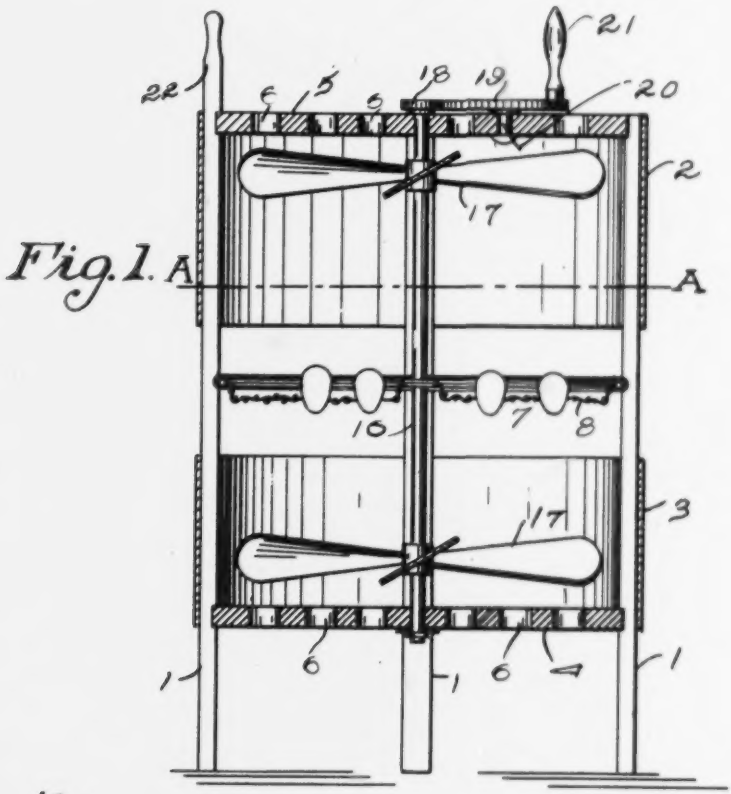

Fig. 1.

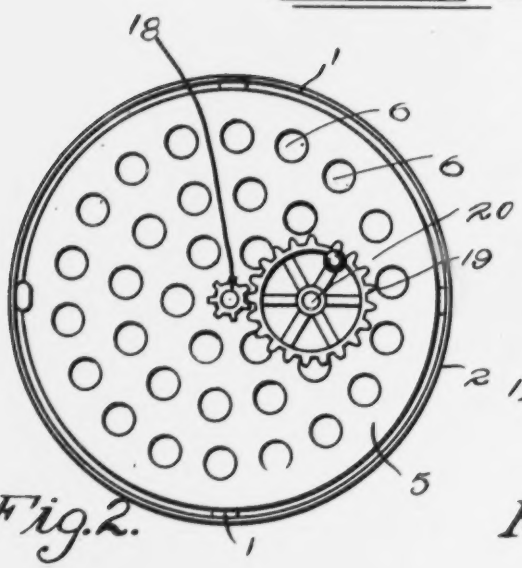

Fig. 2.

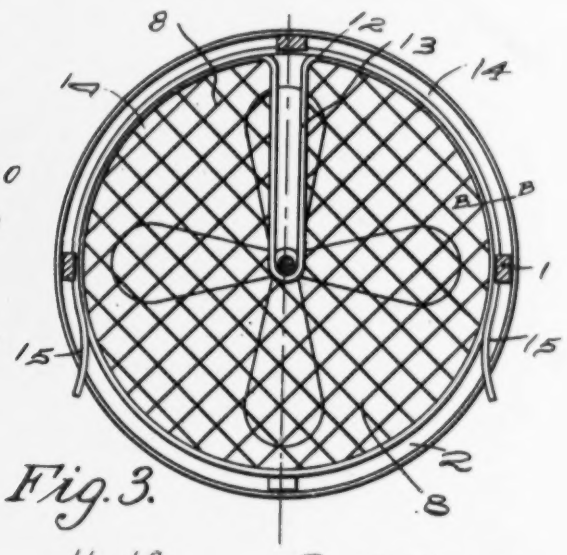

Fig. 3.

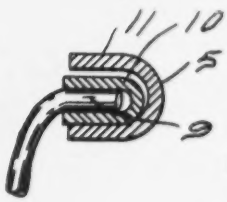

Fig. 4

WITNESSES:

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H. C. Schroeder

INVENTOR

John Wiebe

BY

E. G. Crowman,

ATTORNEY.

UNITED STATES PATENT

JOHN WIEBE, OF PETALUMA, CALIFORN

EGG-DRIER.

992,622. Specification of Letters Patent. Pa

Application filed October 18, 1910. Serial No. 587,

To all whom it may concern:

Be it known that I, JOHN WIEBE, a citizen of the United States, residing at Petaluma, in the county of Sonoma and State of California, have invented certain new and useful Improvements in Egg-Driers, of which the following is a specification.

This invention relates to apparatus for drying eggs and has for its object to provide a light portable and efficacious apparatus for rapidly removing moisture from the shell of eggs after they have been washed.

The invention comprises in its general features a casing so constructed as to permit the passage of air through the same and containing an apertured support to hold a number of eggs and means for moving air over said eggs.

Referring to the accompanying drawings: Figure 1 is a view in vertical section of an apparatus constructed in accordance with this invention. Fig. 2 is a plan view thereof. Fig. 3 is a horizontal section on the line A—A of Fig. 1. Fig. 4 is an enlarged detail view partly in cross section of a portion of the egg tray.

In carrying out the invention a suitable casing is provided, and as here shown, preferably constructed with uprights 1, and an upper and lower cylindrical casing 2 and 3, spaced apart from each other, so as to permit the passage of air between the ends of the casing. The casing is formed with an apertured top and bottom, and as here shown. preferably consists of a bottom 4 and top 5 having apertures 6 for the passage of air, said bottom 4 being mounted on the uprights 1 at a little distance from their lower ends.

Approximately midway between the top and bottom of the casing is located an apertured tray, and as here shown, preferably consisting of a shallow basket 7 formed of reticulated material 8 being of such a depth as to prevent eggs resting in the openings in the reticulated material, as shown in Fig. 1 from being shaken out of place. About the periphery at the top of the basket, the wires in the reticulated material are formed with bent ends 9 which are clamped in an annular U-shaped strip 10 movably mounted in an annular U-shaped metallic strip 11 serving as a support which is secured in any suitable manner to the uprights 1. The tray is held in place by means of a metallic strip

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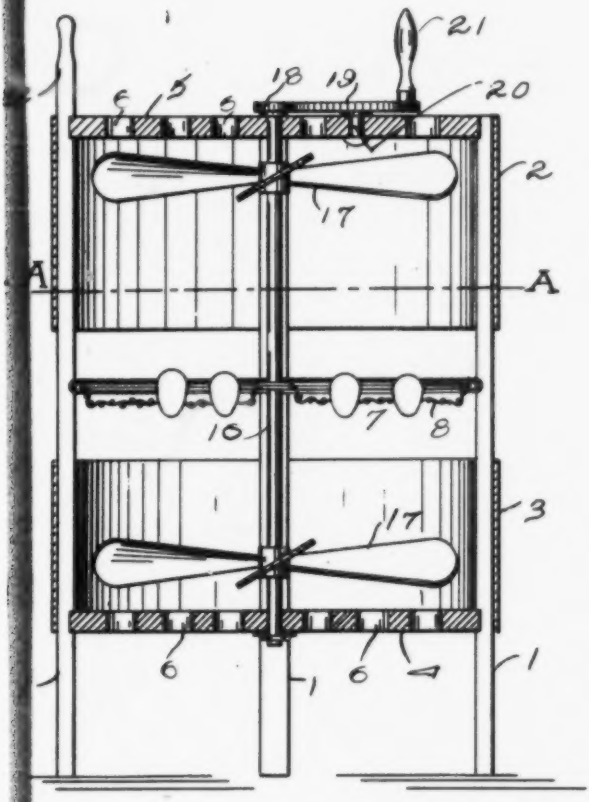
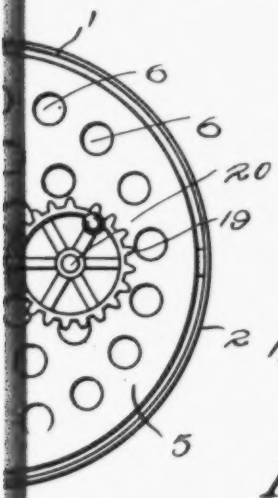
J. WIEBE.

EGG DRIER.

APPLICATION FILED OCT. 18, 1910.

Patented May 16, 1911.





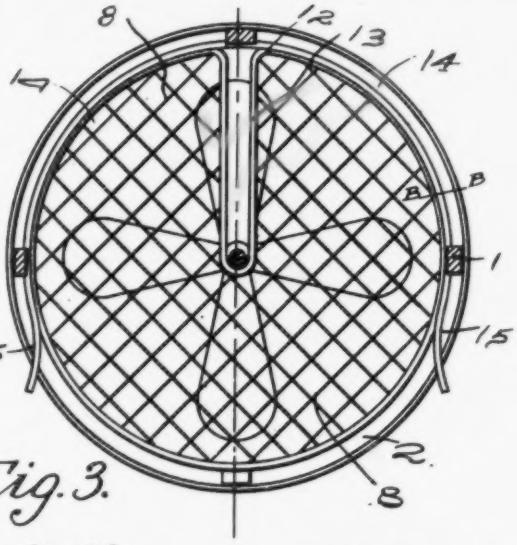


Fig. 3.

Fig. 4

INVENTOR

John Wiebe

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ATTORNEY.

UNITED STATES PATENT OFFICE.

JOHN WIEBE, OF PETALUMA, CALIFORNIA.

EGG-DRIER.

992,622. Specification of Letters Patent. Patented May 16, 1911.

Application filed October 18, 1910. Serial No. 587,663.

To all whom it may concern:

Be it known that I, JOHN WIEBE, a citizen of the United States, residing at Petaluma, in the county of Sonoma and State of California, have invented certain new and useful Improvements in Egg-Driers, of which the following is a specification.

This invention relates to apparatus for drying eggs and has for its object to provide a light portable and efficacious apparatus for rapidly removing moisture from the shell of eggs after they have been washed.

The invention comprises in its general features a casing so constructed as to permit the passage of air through the same and containing an apertured support to hold a number of eggs and means for moving air over said eggs.

Referring to the accompanying drawings: Figure 1 is a view in vertical section of an apparatus constructed in accordance with this invention. Fig. 2 is a plan view thereof. Fig. 3 is a horizontal section on the line A—A of Fig. 1. Fig. 4 is an enlarged detail view partly in cross section of a portion of the egg tray.

In carrying out the invention a suitable casing is provided, and as here shown, preferably constructed with uprights 1, and an upper and lower cylindrical casing 2 and 3, spaced apart from each other, so as to permit the passage of air between the ends of the casing. The casing is formed with an apertured top and bottom, and as here shown, preferably consists of a bottom 4 and top 5 having apertures 6 for the passage of air, said bottom 4 being mounted on the uprights 1 at a little distance from their lower ends.

Approximately midway between the top and bottom of the casing is located an apertured tray, and as here shown, preferably consisting of a shallow basket 7 formed of reticulated material 8 being of such a depth as to prevent eggs resting in the openings in the reticulated material, as shown in Fig. 1 from being shaken out of place. About the periphery at the top of the basket, the wires in the reticulated material are formed with bent ends 9 which are clamped in an annular U-shaped strip 10 movably mounted in an annular U-shaped metallic strip 11 serving as a support which is secured in any suitable manner to the uprights 1. The tray is held in place by means of a metallic strip 12 formed with an extended U-shaped portion 13 and with curved members 14 terminating in spring ends 15 adapted to be sprung between the uprights 1 and the sides of the tray, the U-shaped portion 13 extending over the vertical shaft 16, having its upper and lower ends mounted in the top 5 and the bottom 4 of the casing, and adapted to revolve therein.

Mounted upon the shaft 16 and adjacent to each end thereof is a fan 17, the blades of said fan being pitched so as to drive air in the same direction. The shaft 16 is rotated by any suitable means, and as here shown by means of the pinion 18 meshing with the toothed wheel 19 mounted on a pivot pin 20 in the top 5 and provided with an operating handle 21. The ratio between the gears 18 and 19 is such that the fan shaft will be driven at high speed by a small number of turns of the handle 21.

One of the uprights 1 is provided with an extension 22 which serves as a handle for lifting the casing.

The apparatus is used as follows: Sorted eggs are washed and placed upon the tray which is then slid into place on the supporting hoop 11. By operating the gear mechanism a strong current of air is directed down against the eggs, which current of air is augmented by the suction of the lower fan. This action quickly dries the tops of the eggs and more slowly dries the bottoms thereof, and by reversing the rotation of the fans, the blast may be directed against the bottom of the eggs. By means of this apparatus, eggs may be dried very much quicker than by natural evaporation.

Having described my invention, what I claim is:

1. In an apparatus for drying eggs, a casing having a top and bottom each provided with apertures, an annular opening in said casing between its top and bottom, a basket of reticulated material detachably mounted in said casing, a rotary vertical shaft projecting through said casing, a rotary fan mounted on said shaft adjacent to each end thereof, and means for rotating said shaft in either direction.

2. An apparatus for drying eggs, consisting of uprights, a pair of annular casings mounted on said uprights and spaced apart from each other, the lower casing being elevated above the lower end of said uprights, a perforated bottom in said lower

casing, a perforated top in said upper casing, a shallow reticulated basket detachably mounted in the uprights between said casings, a spring clip for detachably holding said basket in place, a vertical rotary shaft mounted in the bottom and top of said casing, a fan mounted on said shaft, adjacent to each end thereof, and a gear mechanism connected with said shaft for rotating it alternately in opposite directions.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN WIEBE.

Witnesses:
H. C. SCHROEDER,
F. P. SCHROEDER.

918 (Defendants' Exhibit P, Letters Patent No
to J. Schmidt and Schutterle, De
1911.)

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connected with said shaft for rotating it alternately in opposite directions.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN WIEBE.

Witnesses:
H. C. SCHROEDER,
F. P. SCHROEDER.

(Defendants' Exhibit P, Letters Patent No. 1,010,809 to J. Schmidt and Schutterle, December 5, 1911.)

784

J. SCHMIDT & H. SCHÜTTERLE.

APPARATUS FOR DRYING MACARONI AND LIKE BAKERY PRODUCTS.

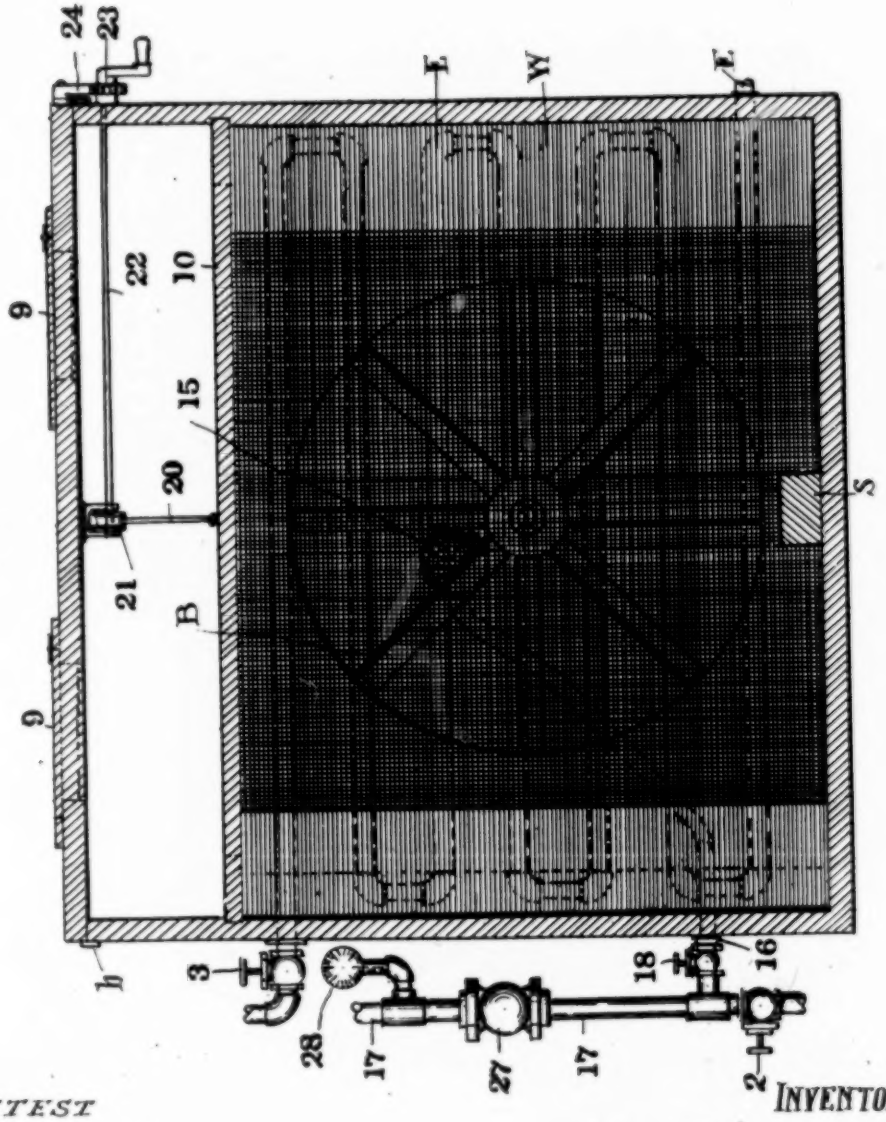
APPLICATION FILED JUNE 9, 1911.

1,010,809.

Patented Dec. 5, 1911.

5 SHEETS—SHEET 5.

Fig. 5



ATTEST

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F. C. Mussun

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786

J. SCHMIDT & H. SCHÜTTERLE.

APPARATUS FOR DRYING MACARONI AND LIKE BAKERY PRODUCTS.

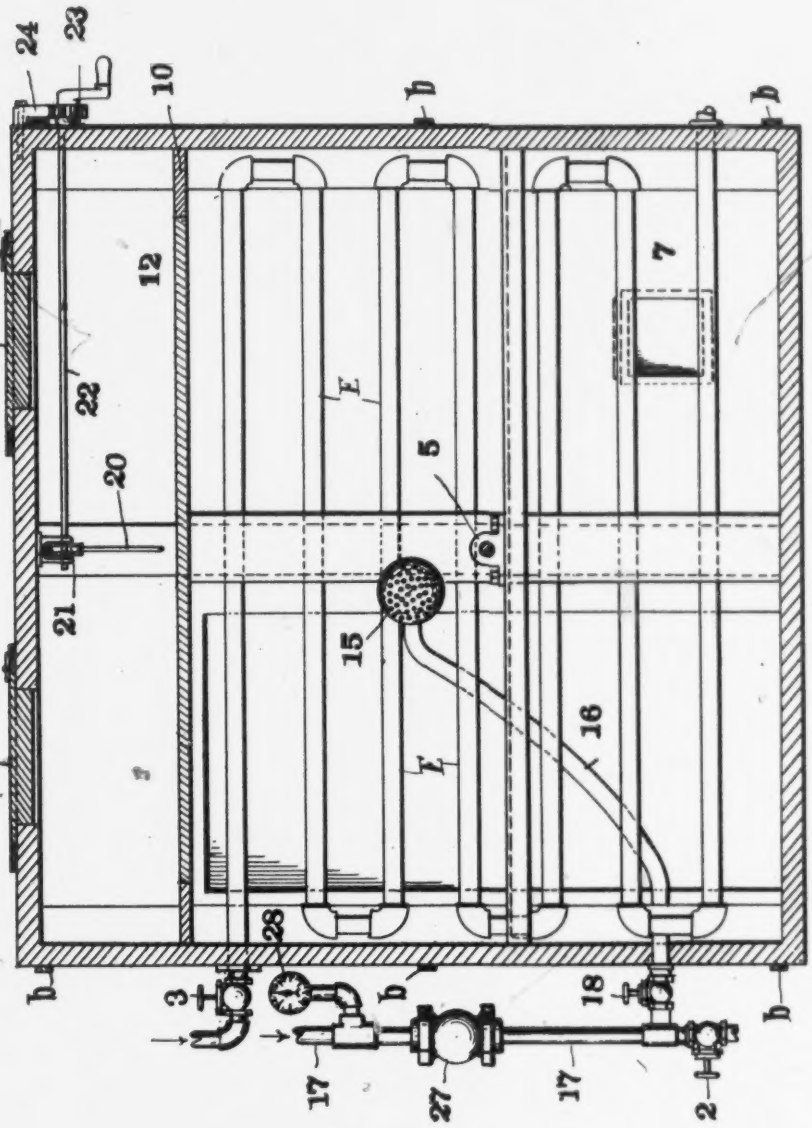
APPLICATION FILED JUNE 9, 1911.

1,010,809.

Patented Dec. 5, 1911.

5 SHEETS—SHEET 4.

Fig. 4



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APPARATUS FOR DRYING MACARONI AND LIKE BAKERY PRODUCTS.

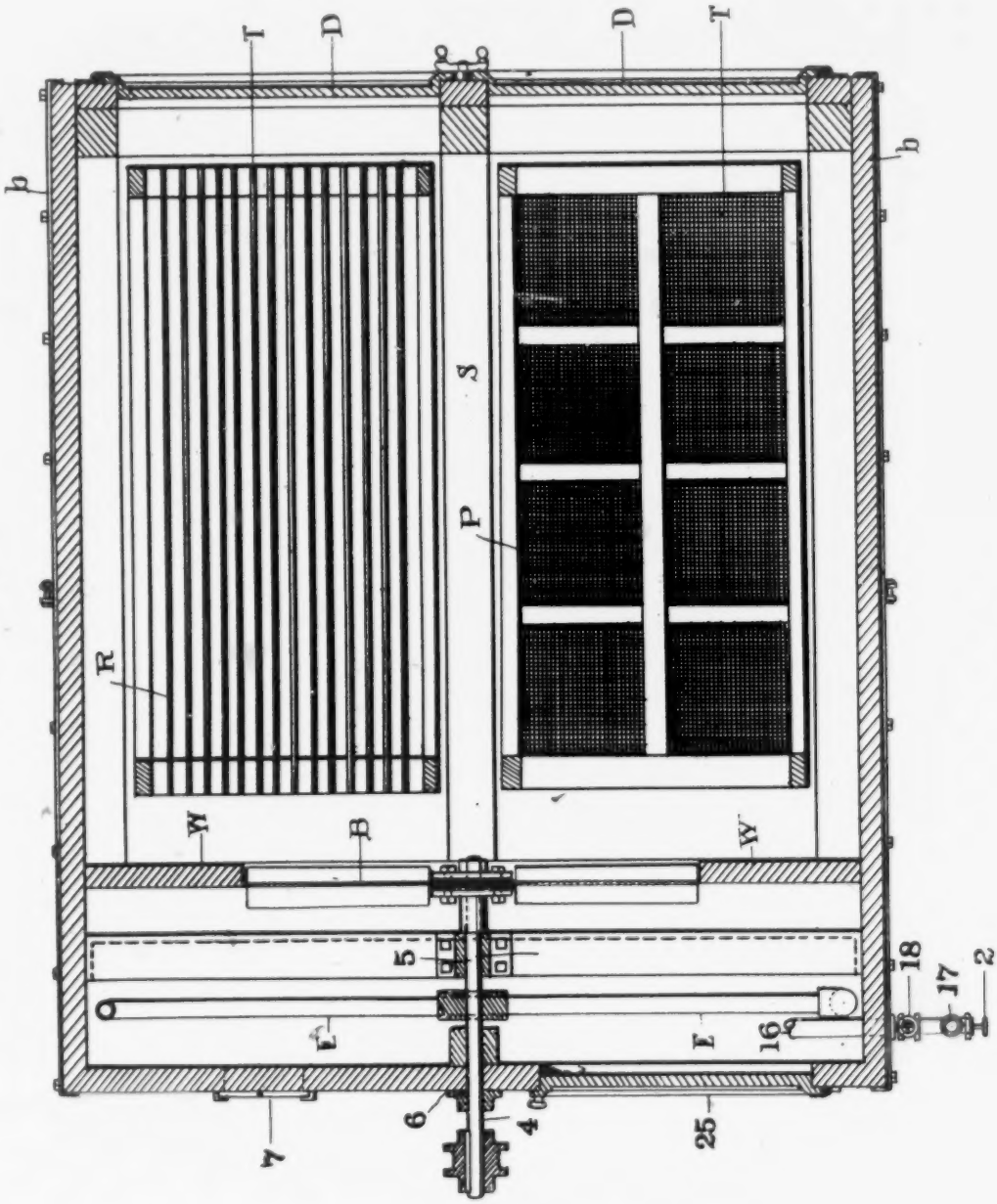
APPLICATION FILED JUNE 9, 1911.

1,010,809.

Patented Dec. 5, 1911.

5 SHEETS—SHEET 3.

Fig. 3



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BY Fisher & Mason
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790

J. SCHMIDT & H. SCHÜTTERLE.

APPARATUS FOR DRYING MACARONI AND LIKE BAKERY PRODUCTS.

APPLICATION FILED JUNE 9, 1911.

1,010,809.

Patented Dec. 5, 1911.

5 SHEETS—SHEET 2.

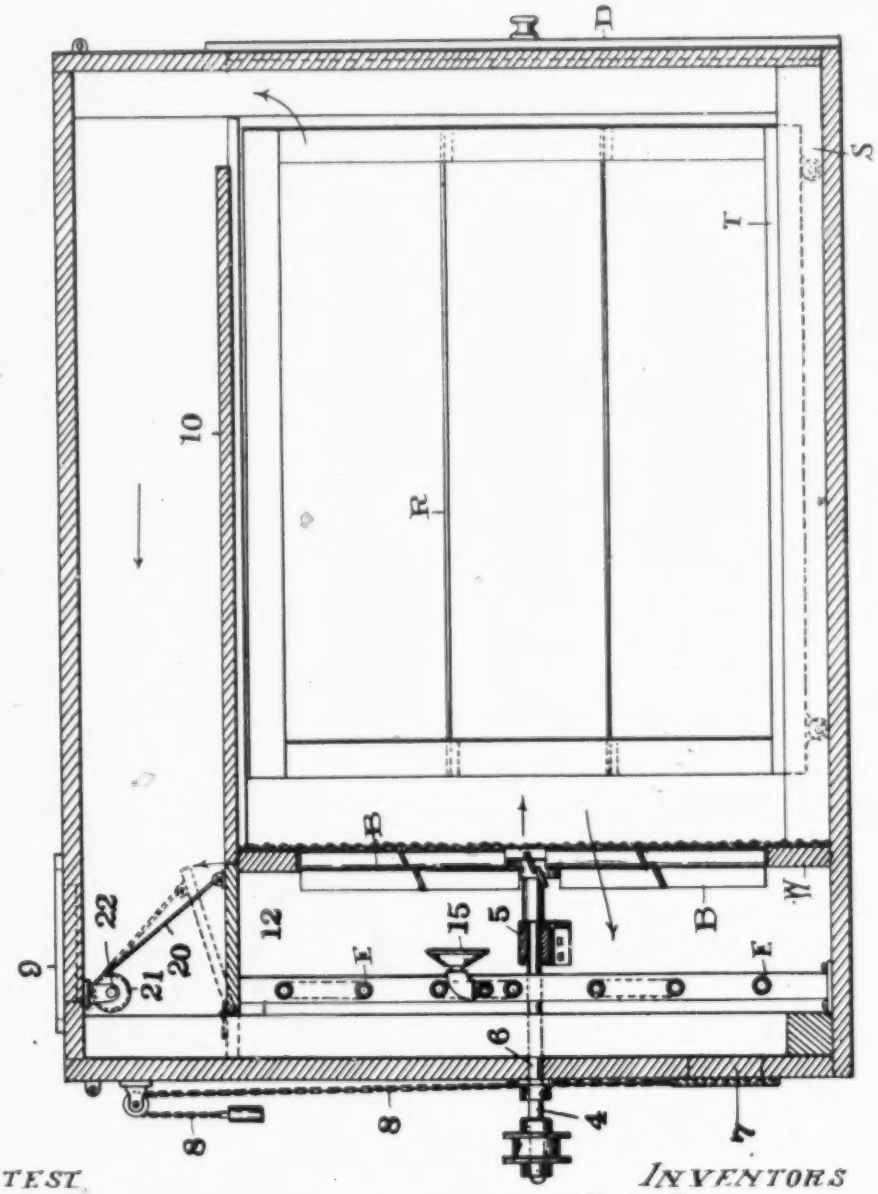

Fig. 2

ATTEST.

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H C Mussun

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HENRY SCHÜTTERLE

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792

APPARATUS FOR DRYING MACARONI AND LIKE BAKERY PRODUCTS.

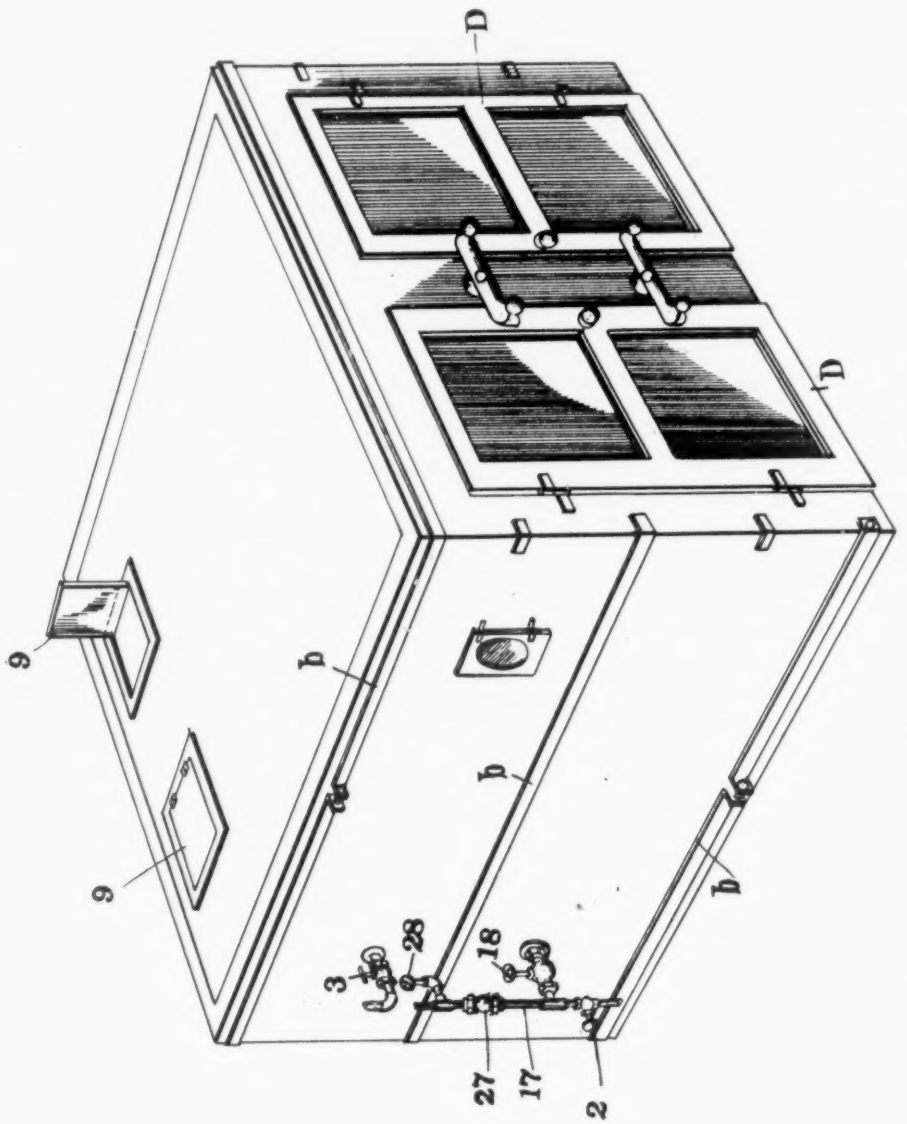
APPLICATION FILED JUNE 9, 1911.

1,010,809.

Patented Dec. 5, 1911.

5 SHEETS—SHEET 1.

Fig. 1



ATTEST

Em. G. Fisher

F. C. Mueseum.

INVENTORS.

JOHN SCHMIDT

HENRY SCHÜTTERLE.

By Fisher Hillard ATTYS.

UNITED STATES PATENT O

JOHN SCHMIDT AND HENRY SCHÜTTERLE, OF CHARDO

APPARATUS FOR DRYING MACARONI AND LIKE BAKERY

1,010,809. Specification of Letters Patent. Pate

Application filed June 9, 1911. Serial No. 632,155.

To all whom it may concern:

Be it known that we, JOHN SCHMIDT and HENRY SCHÜTTERLE, citizens of the United States, residing at Chardon, in the county of Geauga and State of Ohio, have invented certain new and useful Improvements in Apparatus for Drying Macaroni and Like Bakery Products, of which the following is a specification.

This invention has reference to apparatus for drying macaroni and like bakery products, and the invention consists in the construction and combination of parts substantially as shown and described and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a perspective view of the invention. Fig. 2 is a longitudinal sectional elevation thereof substantially through the center. Fig. 3 is a longitudinal sectional plan view of the invention. Fig. 4 is a cross sectional elevation through the heating chamber, and Fig. 5 is a cross sectional view through the drying chamber showing the blower in the rear.

The apparatus as thus shown is designed especially for drying macaroni, but is not necessarily limited to this single use or product.

As shown the invention comprises an inclosure which is say about nine feet in length by about seven feet in width and about six feet in height, over all, and within this outer wall there are several distinct compartments. In the present views we show straps or bands *b* about the said wall as may be needed to hold the same firmly together, and the interior of the apparatus is variously sub-divided into chambers and compartments as the work to be done may require. Thus, the front and main portion of the apparatus comprises the drying chamber which is divided somewhat arbitrarily into two compartments longitudinally, the base sill S constituting part of the main frame being on this line of this division, and each compartment is entered at the front by a door D of a size large enough to run one of the trucks T into and out of the compartment. Said doors are hinged to swing outwardly and the trucks are on suitable wheels or casters and are run upon the floor of the apparatus without tracks in this instance. The said trucks or carriages are further constructed with such means as the particular material to be dried may require. For example, for long or string macaroni we find it advantageou of racks R upon which hung or suspended, poses we may use a seri P. These pans may be above the other and drawn out and replaced or both kinds of trucks equivalent, according stock to be dried. A t arates the said compar chamber, and the stea heating the air for th located in the said h trol of the steam flowi or pipes is by valves 2 lent, outside the main A fan or blower B is opening in the wall driven by shaft 4 from power, said shaft bei able bearings 5 and 6 the rear wall of the connections.

Admission of air t and exhaust is by m or dampers disposed necessary ventilation ample, the bottom rea more or less and sus tion by counterweig equivalent, and in th would be say by doo of the apparatus, th ing through exhaust through the drier the false top 10. B be desirable to me within the apparatus conditions the respe will be closed and t in the top 10 be ope in Fig. 2, more or le over the top of the with the blower in o caused to travel in a paratus and the incr take care of any fur

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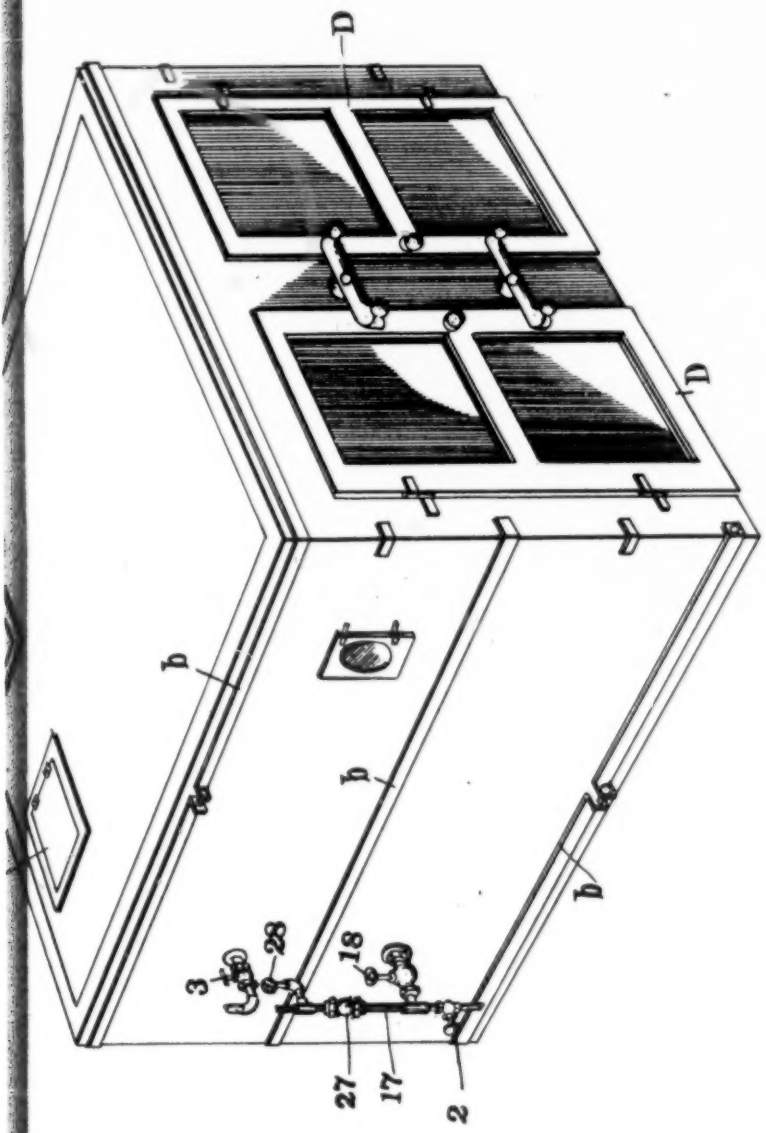
J. SCHMIDT & H. SCHÜTTERLE.

ATUS FOR DRYING MACARONI AND LIKE BAKERY PRODUCTS.

APPLICATION FILED JUNE 9, 1911.

Patented Dec. 5, 1911.

5 SHEETS—SHEET 1.



INVENTORS.

JOHN SCHMIDT

HENRY SCHÜTTERLE.

By Fisher Williams ATTYS.

UNITED STATES PATENT OFFICE.

JOHN SCHMIDT AND HENRY SCHÜTTERLE, OF CHARDON, OHIO.

APPARATUS FOR DRYING MACARONI AND LIKE BAKERY PRODUCTS.

1,010,809. Specification of Letters Patent. Patented Dec. 5, 1911.

Application filed June 9, 1911. Serial No. 632,155.

To all whom it may concern:

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Admission of air to the heating chamber and exhaust is by means of suitable doors or dampers disposed here and there as the necessary ventilation may suggest. For example, the bottom rear door 7 may be raised more or less and sustained in raised position by counterweighted chain 8, or its equivalent, and in that case exit or exhaust would be say by door or doors 9 in the top of the apparatus, the circulation of air being through exhaust fan or blower B and through the drier compartments beneath the false top 10. But if for any reason it be desirable to merely circulate the air within the apparatus under increasing heat conditions the respective inlets and outlets will be closed and the door or damper 12 in the top 10 be opened, say about as seen in Fig. 2, more or less. This extends across over the top of the heating chamber, and with the blower in operation the air will be caused to travel in a circuit through the apparatus and the increasing heat thereof will take care of any further absorbed moisture.

Sometimes it occurs that the condition of the material on the racks or in the pans requires more surface moisture than it possesses inherently, and in such cases we employ a steam spray 15 which more or less saturates the air and meets the requirements. This spraying head is connected by pipe 16 with the main steam supply pipe

17 and is controlled by valve 18. The door 12 is controlled in this instance from the side of the apparatus by a cord 20 over sheave 21 on rod 22 which has a ratchet head 23 outside the main wall and a pawl 24 to engage and hold the same. Entrance to the heating chamber is by door 25, Fig. 3. A steam pressure reducing valve 27 is employed in the steam pipe connection between valves 2 and 3 and a pressure gage 28 is shown in connection with said pipe 17.

What we claim is:

1. An apparatus for drying macaroni having a drying compartment provided with a draft passage front to rear in its top, and a door opening from the outside into the rear of said passage, a heating chamber across the rear of said drying compartment and a door at its top from said passage, a blower between said heating chamber and said compartment and a spraying device in said heating chamber.

2. An apparatus for drying macaroni having drying compartments side by side and a door to enter a truck at the front of each compartment opening down to the floor thereof, a heating chamber and a wall between the same and said compartments and steam heating pipes in said chamber, a blower to force the air from said heating chamber into said drying compartments located in the said wall, a draft passage over said compartments front to rear, a door opening from the discharge end of said passage into said heating chamber, and means in said drying chamber to moisten the air therein.

3. A macaroni drying apparatus comprising a heating chamber and a drying compartment in front thereof and a wall between said chamber and compartment, a rotary blower in said wall adapted to discharge into said compartment, a steam spray in said heating chamber behind said blower and arranged to discharge toward the same, and a steam supply pipe and valves to control the flow of steam to said spray.

In testimony whereof we affix our signatures in presence of two witnesses.

JOHN SCHMIDT.
HENRY SCHÜTTERLE.

Witnesses:
MIKE SHULLER,
SAM A. BARBER.

930 (Defendants' Exhibit P, Letters Patent No. 1,075,7
to C. W. Zimmer, October 14, 1913.)

by valve 18. The door this instance from the tus by a cord 20 over 22 which has a ratchet main wall and a pawl old the same. Entrance mber is by door 25, Fig. re reducing valve 27 is eam pipe connection be- 3 and a pressure gage nection with said pipe 17.

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In testimony whereof we affix our signatures in presence of two witnesses.

JOHN SCHMIDT.
HENRY SCHÜTTERLE.

Witnesses:
MIKE SHULLER,
SAM A. BARBER.

930 (Defendants' Exhibit P, Letters Patent No. 1,075,747 to C. W. Zimmer, October 14, 1913.)

796

C. W. ZIMMER.

SEMIFIRELESS INCUBATOR.

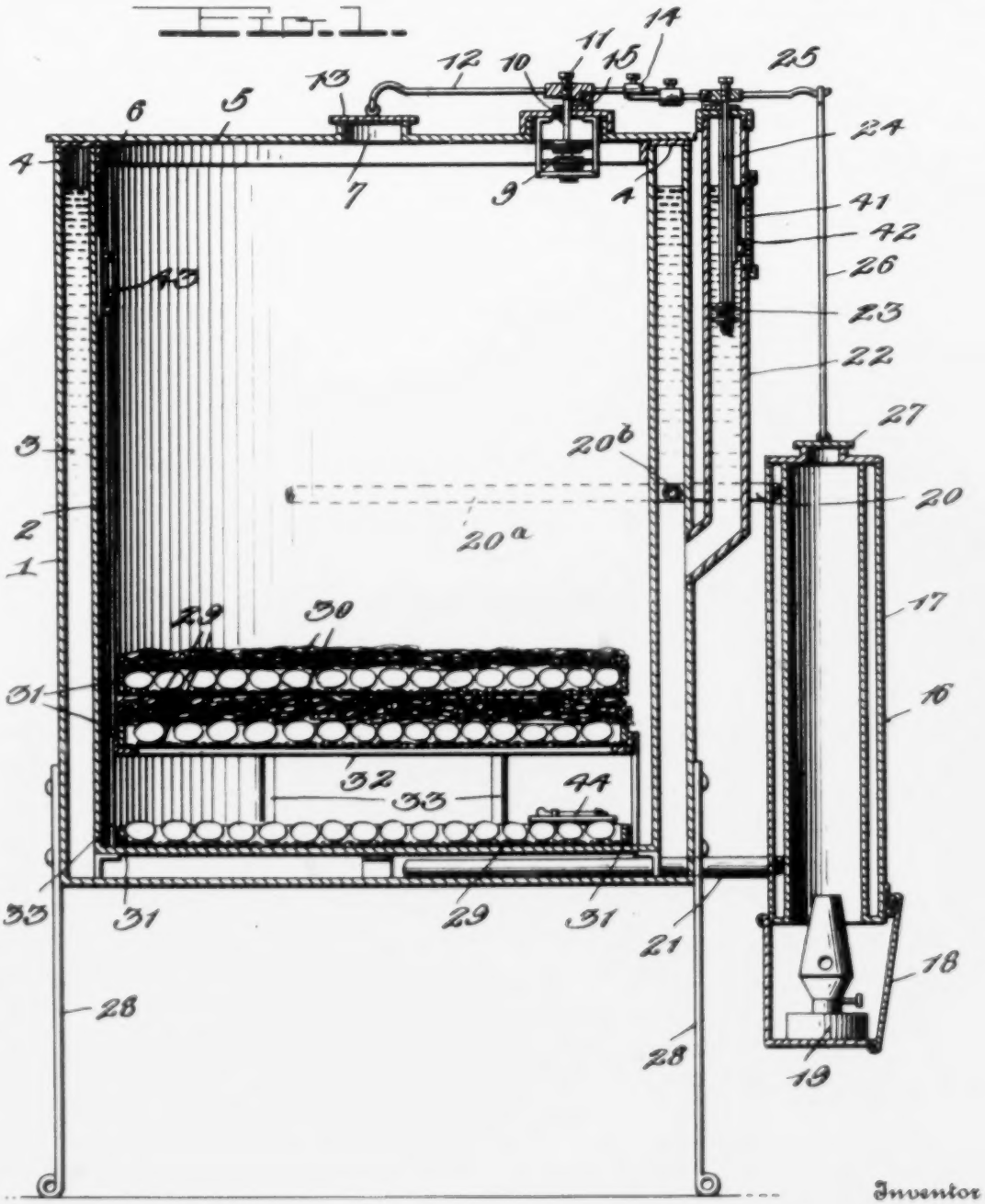
APPLICATION FILED DEC. 14, 1911.

1,075,747.

Patented Oct. 14, 1913.

3 SHEETS—SHEET 1.

Fig. 1.



Inventor

Witnesses

Chas. L. Griebauer.

G. B. Norton.

Cyrus W. Zimmer,

By Watson E. Coleman.

Attorney

798

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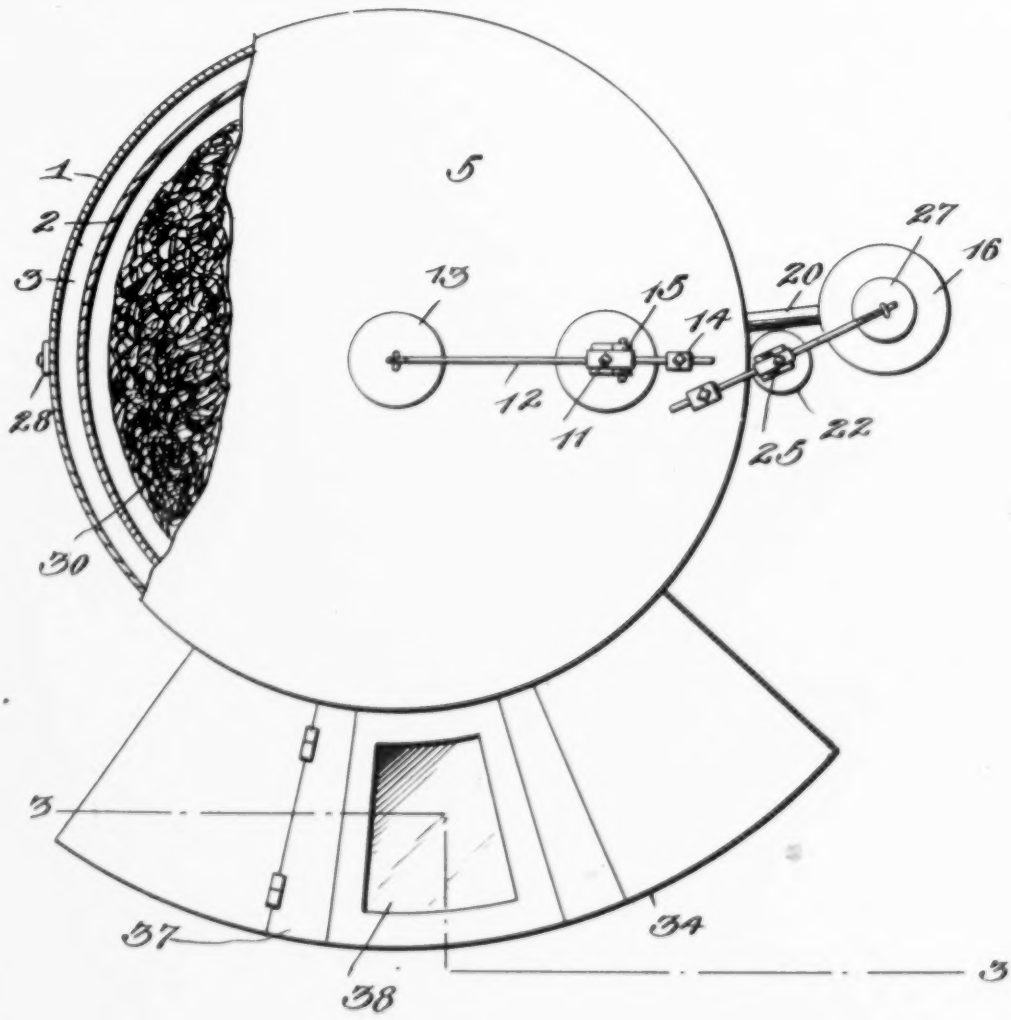
3 SHEETS—SHEET 2.

Fig. 2.



Witnesses
Chas. L. Griesbauer.
A. B. Norton.

Inventor
Cyrus W. Zimmer,
By Watson E. Coleman
Attorney

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3 SHEETS—SHEET 3.

Fig. 3.

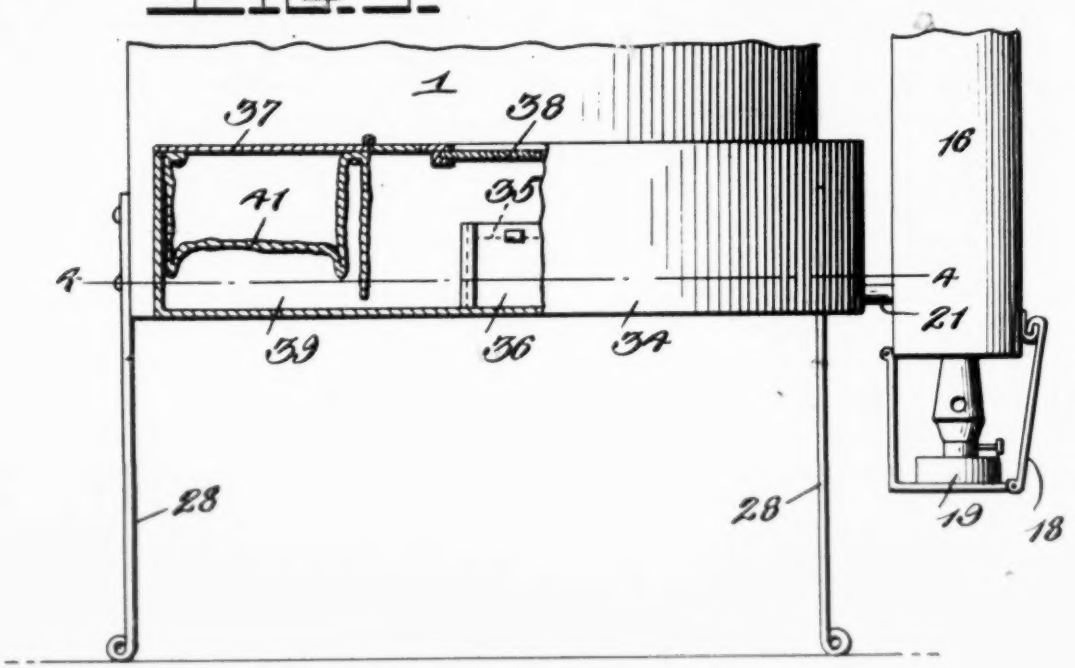
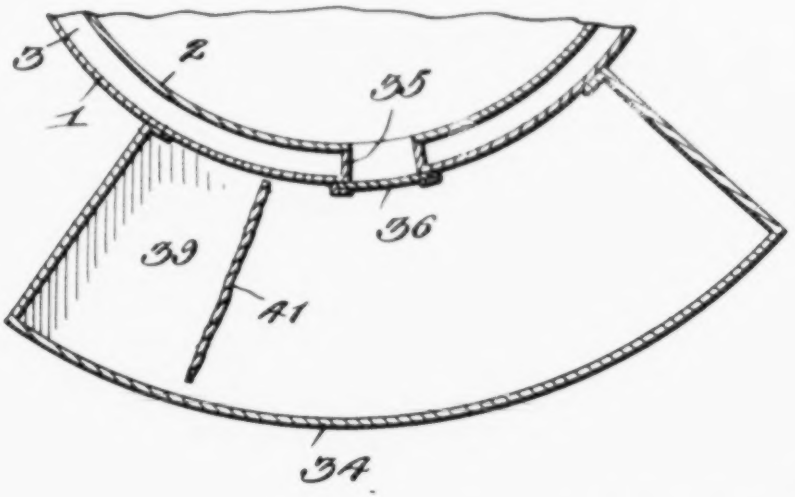


Fig. 4.



Inventor

Cyrus W. Zimmer,

Witnesses

Chas. L. Griesbauer.

G. B. Norton.

By Watson E. Coleman.

Attorney

UNITED STATES PATENT

CYRUS W. ZIMMER, OF NEW YORK, N. Y.

SEMIFIRELESS INCUBATOR.

1,075,747. Specification of Letters Patent. Pate

Application filed December 14, 1911. Serial No. 665,653.

To all whom it may concern:

Be it known that I, CYRUS W. ZIMMER, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Semifireless Incubators, of which the following is a specification, reference being had to the accompanying drawings.

This invention is an improved incubator, which I term a semi-fireless incubator and by means of which the animal heat of the eggs which, after having been partially incubated by artificially or externally applied heat may be utilized for incubating other eggs, supplied to the incubator from time to time, one object of my invention being to effect improvements in the construction of the incubator, whereby a uniformity of heat may be maintained.

The invention further consists in the construction, combination and arrangement of devices hereinafter described and claimed.

In the accompanying drawings: Figure 1 is a vertical sectional view of an incubator constructed in accordance with my invention; Fig. 2 is a plan view of the device with parts broken away. Fig. 3 is an elevation, partly in section of my improved incubator, showing a nursery on one side thereof, the nursery being indicated in section; and Fig. 4 is a fragmentary horizontal section through the device as seen on line 4—4, Fig. 3.

The body of my improved incubator comprises an outer shell or casing 1, here shown as cylindrical in form, and an inner vessel 2 which corresponds in shape with and is somewhat smaller than the outer shell and is spaced from the sides and bottom of the latter so that a water space 3 is formed between the bottoms and also between the side walls of the outer and inner vessels. These vessels are preferably made of sheet metal, but may be made of any suitable material. The water space between the vessels is closed at the top as at 4. A removable cover 5 is provided for the inner vessel which constitutes the incubating chamber, and said cover also extends over the top 4. This cover is here shown as provided with an annular flange 6 to fit within the wall of the inner vessel and also has a centrally located ventilating opening 7. On the under side of the cover and carried thereby is a thermostatic wafer 9 which is supported by a suitable bracket or h
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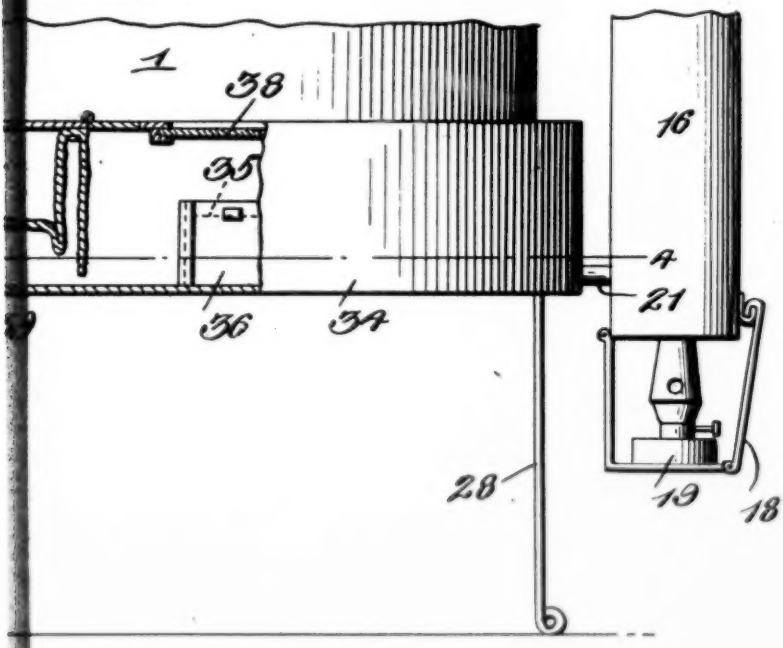
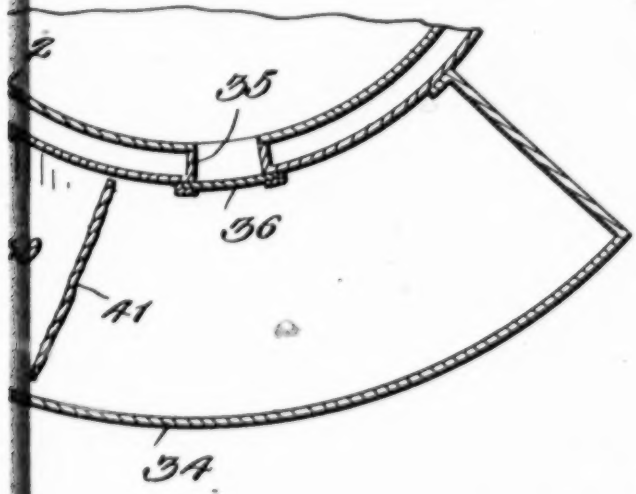


FIG. 4.



Inventor

Cyrus W. Zimmer,

...auer. By Watson E. Coleman.

Attorney

UNITED STATES PATENT OFFICE.

CYRUS W. ZIMMER, OF NEW YORK, N. Y.

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That portion of the flow pipe 20 within the incubator is provided with two curved branches 20^a, which extend partly around in the water space 3, the two branches, in practice, extending about two-thirds the circumference of the incubator. This pipe carries the water in opposite directions about two-thirds of the way around the incubator and the open ends of the branches permit the water from said pipe to flow into and mingle with the water in the water space. Openings 20^b are also provided in these branches to permit of the partial escape of the heated water at different points around the incubator. These openings are of such size and number and are so located as to cause the temperature of the water in the water space or chamber to be the same at all points. The water in the water chamber is in contact with the branches 20^a containing the heated supply water, takes up the heat thereof to some extent and assists in reducing the temperature of the supply water in the branches before it is permitted to escape therefrom and, hence, this also assists in securing an equal distribution of the heated water.

A vertical pipe 22 leads from one side of the water space of the incubator body and is filled with water therefrom, and in this pipe is placed a thermostatic wafer 23 which is similar to the wafer 8 hereinbefore described and, through the instrumentality of a pin 24, operates a weighted lever 25, the longer arm of which is connected, by a wire 26, to a damper 27 which operates at the upper end of the water jacketed flue.

The wafer 9, in connection with the damper 13 of the incubating chamber, constitutes an auxiliary regulator, located on the lid of the incubator, which serves to allow the operator to permit a certain amount of ventilation for the incubating eggs all of the time, which ventilation may be increased or decreased at will. The auxiliary regulator also prevents the chicks from being killed by being overheated, in the event that the regulator for the heating apparatus should fail to operate.

The thermostatic wafer 23, in connection with the damper 27, directly controls the draft from the lamp and, hence, also the heating efficiency of the water jacketed flue and, thereby, my improved incubator is doubly regulated as to its temperature and hence I am enabled to readily maintain the required even temperature in the incubating chamber. Moreover, the incubating chamber is automatically ventilated, as will be understood. Suitable supporting legs such as are indicated at 28 are provided for the body of the incubator to support the same at the desired distance above the floor.

In practice, my incubator is preferably made of such size as to provide a capacity for a thousand eggs, the inner diameter of the inner vessel 2, which constitutes the incubating chamber, being twenty-two inches and the height thereof twenty-eight inches. The incubator may, however, be made of any size desired.

A series of removable egg trays 29 is also provided and a series of mats 30 which are preferably feather mats. The trays are made of wire mesh and each is provided with a metal rim 31. The diameter of the trays is less than that of the incubating chamber. In practice, where the incubating chamber is twenty-four inches in diameter I make the trays twenty-two inches in diameter so that when the trays are placed in the center of the incubating chamber there is an air space of one inch around them for ventilation.

In practice I employ a thermometer 41, in the pipe 22, suspended therein and submerged in the water. The pipe has a glazed opening 42 in one side, through which the said thermometer may be inspected. I also, when the incubator is in operation, use thermometers 43, suspended in the incubating chamber at different heights in the space around the layers of eggs, and I may also place a thermometer 44 in each egg tray, with the eggs under the feather mats, hence enabling the operator to know the temperature of the water which heats the incubator, the temperature of the air in the incubating chamber surrounding the eggs, as well as the temperature of the eggs in each and every tray.

In the operation of my incubator, and by my improved method of hatching, I introduce a layer of eggs, progressively from day to day. On the first day a layer of eggs is placed directly in the bottom of the incubating chamber, after the incubator has been artificially heated and while the heating apparatus is in operation, and a feather mat is placed on said layer. On the second day another layer is placed in the bottom of the incubating chamber, the first layer being placed in one of the trays and disposed on the new layer, and separated therefrom by a feather mat and also covered by another feather mat. I continue this process from day to day, supplying a new layer each day at the bottom of the incubating chamber and raising the other layers, so that the layers are disposed in the order of their ages, with the oldest eggs on top. I continue this for ten consecutive days. During this period the incubator is artificially heated and is kept at the usual incubating temperature, and I continue this artificial heating for two days longer, or until the twelfth day is reached and the upper layer of eggs is twelve days old in point of incubation. By this time incubation has so far progressed in the eggs of the upper layer that there is circulation of blood in the embryos of that layer and the said layer gives off considerable animal heat. At this point in the period of incubation the lamp is extinguished and the incubator allowed to cool gradually, and when it has become partially cooled all the trays containing the eggs are taken out of the incubator and a mat of feathers is placed on the bottom of the incubating chamber. The eggs are now replaced in the incubating chamber in reverse order to the former arrangement, that is to say, the oldest eggs in point of incubation are placed in first, at the bottom of the superimposed trays or layers of eggs, the newest eggs being on top. Hence, the eggs in which incubation has progressed so far as to cause them to give out animal heat are below the other eggs and this animal heat is utilized to maintain the required temperature in the incubating chamber and to continue the hatching of all of the eggs. The artificial heating may be wholly or partially discontinued or may be progressively reduced from day to day, according to the conditions.

It will be understood that each layer of eggs supports the weight of the eggs in the

upper layers and that the eggs in the bottom layer in which the process of incubation is the most advanced, support the weight of all the other eggs. The heat of the hatching eggs causes them to expand and apply pressure to the shells, thus tending to disintegrate the shells, and this disintegrating process is greatly promoted and facilitated by the weight of the superincumbent layers of eggs, the weight tending to flatten the lower eggs, change the shape of their shells and, hence, aiding in their decomposition and rendering them somewhat more brittle. This enables the chicks, when the hatching is complete, to be liberated more easily.

When the day arrives for the hatching of the lowest layer of eggs, said layer is relieved of the weight of the other layers. To effect this, the other layers are removed, a support is placed in the bottom of the incubator, and the layers of eggs are then replaced in the same order as before.

A suitable support is shown in Fig. 1 and comprises a circular form 32 having a series, say about six, of supporting legs 33. The height of this support is such that it forms a space of about an inch above the bottom layer and below the next lowest layer, thereby providing room for the chickens to hatch at the bottom of the incubator.

I also provide a nursery 34 for the newly hatched chickens. This nursery is on one side of the incubator, directly in contact therewith and is reached by the chicks through an opening 35 with which the incubator is provided, there being a slide 36 to cover this opening when desired. The nursery has a lid 37 provided with a glazed opening 38 which admits light thereto. The chicks after hatching and becoming strong enough to run around, see and are attracted by this light, which also shines through the opening 35, and go into the nursery chamber, where gravel would be placed on the floor. At one end of the nursery is a hover chamber 39, curtained off, as at 40, and provided with a hover blanket 41, suspended from the top, under which the chicks can cuddle for warmth, a considerable degree of heat being supplied by the warm air which comes in from the incubating chamber. The lid of the nursery may be a sliding one, capable of being opened either partially or entirely, as desired.

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HERBERT D.
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The feather mats which I employ in my incubator to cover the layers of eggs serve to retain heat and also to ventilate the eggs and closely approach natural conditions. By making the egg trays of less diameter than the incubator chamber in which they are placed the eggs in the incubator chamber are kept surrounded on all sides by the air in the incubator chamber and, hence, they are effectually ventilated.

The construction of my improved fireless incubator is such that the operator has a wide control over the necessary conditions for successful incubation, in that he can vary the number of cover mats over the eggs in the incubating chamber as may be required to retain the necessary heat and moisture in the incubating chamber under varying conditions, as to locality, altitude, heat and cold, and the season of the year.

Having thus described my invention I claim:

An incubator comprising an outer casing, an inner casing spaced from the latter to provide a water space between the sides and bottoms of the same, a vertical pipe disposed outside of the outer casing and having the lower end thereof communicating with said water space intermediate the upper and lower ends thereof, said pipe extending to a point above the top of the outer casing and adapted to contain water to the same height as that in the water space, means to heat and maintain circulation in said water space including a heater, and a flue in connection therewith disposed beyond the outer casing, a damper for said flue, a thermostatic wafer disposed in said pipe from the top thereof to be partially immersed in the water therein, means in connection with the upper end of said wafer and said damper for thermostatically regulating the latter, whereby to regulate the heating of the water in the water space, a removable top applied to the upper ends of said casings, said top being provided with a damper, and additional means carried by said top and actuated by the heat units in the inner casing for thermostatically regulating the last mentioned damper.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

CYRUS W. ZIMMER.

Witnesses:
HERBERT D. COHEN,
JEREMIAH O. CROWLEY.

805

No. 3119 EV

Def. Ex. Q

URE'S DICTIONARY

OF

ARTS, MANUFACTURES AND MINES

CONTAINING A

CLEAR EXPOSITION OF THEIR PRINCIPLES AND PRACTICE

EDITED BY ROBERT HUNT, F.R.S.

Keeper of Mining Records

Formerly Professor of Physics, Royal School of Mines, &c. &c.

ASSISTED BY NUMEROUS CONTRIBUTORS EMINENT IN SCIENCE AND FAMILIAR WITH MANUFACTURES

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SIXTH EDITION, CHIEFLY REWRITTEN AND GREATLY ENLARGED

IN THREE VOLUMES—VOL. II. MINNEAPOLIS

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IN THREE VOLUMES—VOL. II.

MINNEAPOLIS ATHENÆUM

LONDON

LONGMANS, GREEN, AND CO.

1867

The right of translation is reserved

carry on some public service; and the person to whom the advance is made is called the "imprest accountant."

INCUBATION, ARTIFICIAL. The Egyptians have from time immemorial been accustomed to hatch eggs by artificial warmth, without the aid of hens, in peculiar stoves, called *Mammals*. M. de Reaumur published in France, about a century ago, some ingenious observations upon this subject; but M. Bonnemain was the first person who studied with due attention all the circumstances of artificial incubation, and mounted the process successfully upon the commercial scale. So far back as 1777 he communicated to the Academy of Sciences an interesting fact, which he had noticed, upon the mechanism employed by chicks to break their shells; and for some time prior to the French revolution he furnished the Parisian market with excellent poultry at a period of the year when the farmers had ceased to supply it. His establishment was ruined at that disastrous era, and no other has ever since been constructed or conducted with similar care. His apparatus derives peculiar interest from the fact that it was founded upon the principle of the circulation of hot water, by the intestine motions of its particles, in a returning series of connected pipes; a subject afterwards illustrated in the experimental researches of Count Rumford. It has of late years been introduced as a *novelty* into this country, and applied to warm the apartments of many public and private buildings. The following details will prove that the theory and practice of hot water circulation were as perfectly understood by M. Bonnemain fifty years ago, as they are at the present day. They were then publicly exhibited at his residence in Paris, and were afterwards communicated to the world at large in the interesting article of the *Encyclopédie Technologique*, intitled *Incubation Artificielle*, under the head of *Régulateur de Température*.

The apparatus of M. Bonnemain consisted: 1, of a boiler and pipes for the circulation of water; 2, of a regulator calculated to maintain an equable temperature; 3, of a stove-apartment, heated constantly to the degree best fitted for incubation, which he called the *hatching* pitch. He attached to one side a *poussinière* or chick-room, for cherishing the chickens during a few days after incubation.

The boiler is represented in vertical section and ground plan, in *figs.* 987 and 988. It is composed of a double cylinder of copper or cast iron *l*, *l*, having a grate *b* (see plan), an ashpit at *d* (section). The water occupies the shaded space c, c. *h*, *g*, *g*, *e*, *e*, are five vertical flues for conducting the burnt air and smoke, which first rise in the two exterior flues *e*, *e*, then descend in the two adjoining flues *g*, *g*, and finally remount through the passages *i*, *i*, in the central flue *h*. During this upwards and downwards circulation, as shown by the arrows in the section, the products of combustion are made to impart nearly the whole of their heat to the water by which they are surrounded. At the commencement, some burning paper or wood shavings are inserted at the orifice *m*, to establish a draught in this circuitous chimney. The air is admitted into the ashpit at the side, in regulated quantities, through a small square door, movable round a rod which runs horizontally along its middle line. This swing valve is acted upon by an expanding bar (see HEAT-REGULATOR), which opens it more or less, according to the temperature of the stove apartment in which the eggs are placed.

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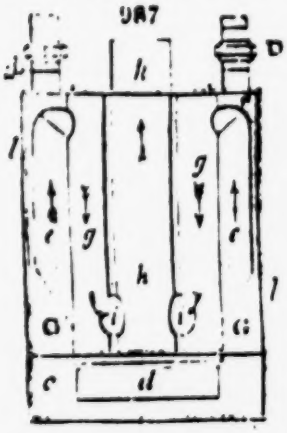

D is the upper orifice of the boiler, by which the hotter and consequently lighter particles of the water continually ascend, and are replaced by the cooled particles, which enter the boiler near its bottom, as shown in *fig.* 989 at R. Into further details relative to the boiler it is needless to enter; for though its form, as designed by M. Bonnemain, is excellent and most economical of heat for a charcoal fire, it would not suit one of pit-coal, on account of the obstruction to the pipes which would soon be caused by its soot.

In *fig.* 989 the boiler is shown at R, with the rod which regulates the air door of the ashpit. D is a stopcock for modifying the opening by which the hotter particles of water ascend; G is the water pipe of communication, having the heating pipe of distribution attached between E F, which thence passes backwards and forwards with a very slight slope from the horizontal direction, till it reaches the *poussinière* O P Q. It traverses this apartment, and returns by N N to the orifice of the boiler H, where it turns vertically downwards, and descends to nearly the bottom of the boiler, discharging at that point the cooled and therefore denser particles of water to replace those which

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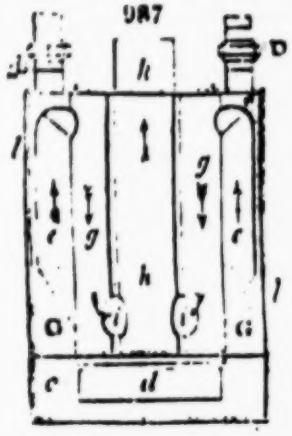

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The faster the water gets cooled in the serpentine tubes, the quicker its circulation will be, because the difference of density between the water at the top and bottom of

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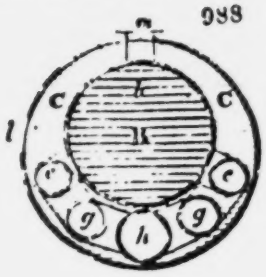

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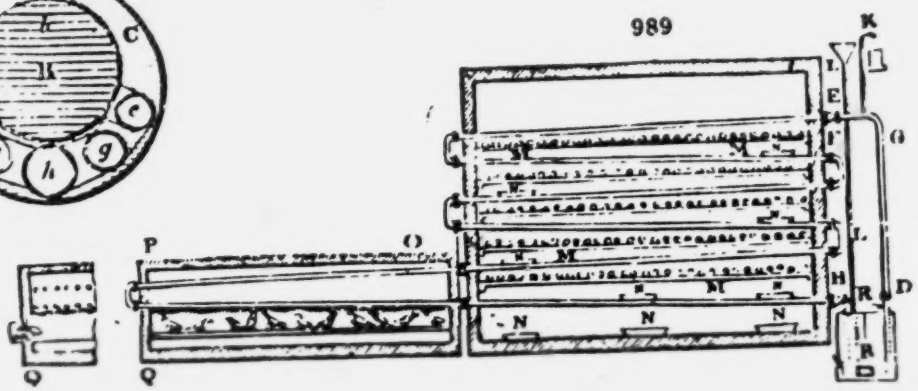

the boiler, which is the sole cause of its movement, will be greater. N represents small saucers filled with water, to supply the requisite moisture to the heated air, and to place the eggs, arranged along the trays M M, in an atmosphere analogous to that under the body of the hen.

When we wish to hatch eggs with this apparatus, the fire is to be kindled in the boiler, and as soon as the temperature has risen to about 100° F., the eggs are introduced; but only one-twentieth of the whole number intended, upon the first day: next day a like number is laid upon the trays, and thus in succession for twenty days, so that upon the twenty-first day the eggs first placed may be hatched for the most part, and we may obtain daily afterwards an equal number of chicks. In this way regularity of care is established in the rearing of them.

During the first days of incubation, natural as well as artificial, a small portion of the water contained in the egg evaporates by the heat, through the shell, and is replaced by a like quantity of air, which is afterwards useful for the respiration of the animal. If the warm atmosphere surrounding the eggs were very dry, such a portion of the aqueous part of the eggs would evaporate through the pores of the shells as would endanger the future life of the chick *in ovo*. The transpiration from the body of the hen, as she sits upon her eggs, counteracts this desiccation in general; yet in very dry weather many hatching eggs fail from that cause, unless they be placed in moist decomposing straw. The water saucers N N are therefore essential to success in artificial incubation.

After the chickens are hatched they are transferred into the nursery, O Q, on the front side of which there is a small grated trough filled with millet seed. Small divisions are made between the broods of successive days, to enable the superintendent to vary their feeding to their age.

In order to supply an establishment of the common kind, where 100 eggs are to be hatched daily, a dozen of hens would be needed, and 150 eggs must be placed under them, as only two-thirds in general succeed. At this rate, 4300 mothers would be required to sit. Now supposing we should collect ten times as many hens, or 43,000, we should not be able to command the above number of chickens, as there is seldom a tenth part of hens in a brooding state. Besides, there would be in this case no fewer than 720 hens every day coming out with a fresh brood of chickens, which would require a regiment of superintendents.

Artificial Incubation by means of Hot Mineral Waters. — This curious process is described very briefly in a letter by M. D'Arcet. The following are extracts from his letter: —

"In June, 1825, I obtained chickens and pigeons at Vichy, by artificial incubation, effected through the means of the thermal waters of that place. In 1827 I went to the baths of Chaudes-Aigues, principally for the purpose of doing the same thing there. Finding the proprietor a zealous man, I succeeded in making a useful application of this source of heat to the production of poultry.

"The advantage of this process may be comprehended, when it is known that the invalids who arrive at Vichy, for instance in the month of May, find chickens only the

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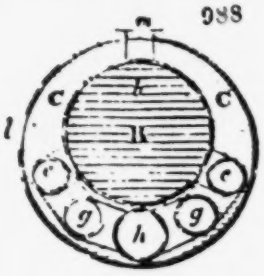

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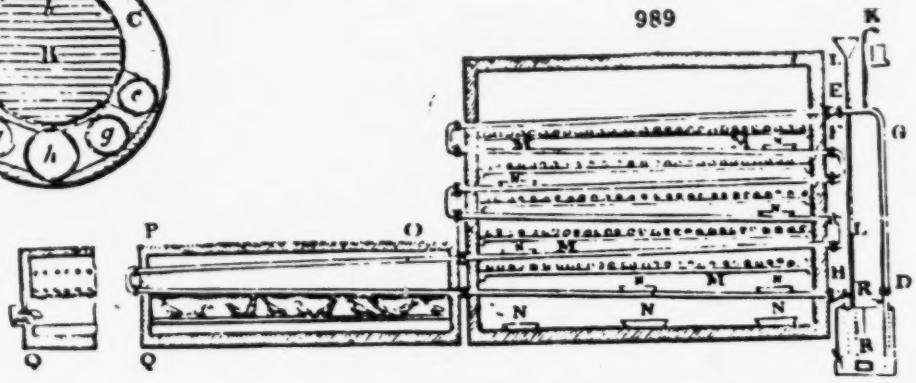

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"The advantage of this process may be comprehended, when it is known that the invalids who arrive at Vichy, for instance in the month of May, find chickens only the size of quails; whereas, by this means, they may be readily supplied six months old.

"The good which may be done by establishing artificial incubation in places where hot springs exist, is *incalculable*; it may be introduced into these establishments without at all interfering with the medical treatment of patients, since the hatching would go on in winter, at a time when the baths for other purposes are out of use.

Ven'ti-lat'ing Mill-stones. The system of ventilating mill-stones by vacuum or plenum, by a blast of air in the eye or a suction-fan to the case, seems to have been invented about 1844.

See English patents:	Newton, 11,084	A. D. 1846.
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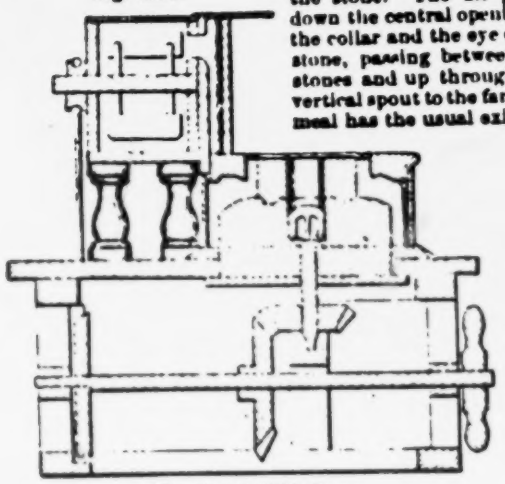
Fig. 6957 may be taken as an illustration. The collar is connected to the curb by the elastic annular diaphragm, and its lower edge is received in an annular groove in the top of the stone. The air passes down the central opening in the collar and the eye of the stone, passing between the stones and up through the vertical spout to the fan The meal has the usual exit.

Fig. 6957.



Ventilated Mill-Stone.

Ven'ti-lat'ing-stack. (*Mining.*) A high stack with a partition and air-furnaces, and connected with the ventilating-flue.

Ven'ti-lat'ing Wa'ter-wheel. The water-wheel bucket has an escape for the air toward the interior of the wheel, so as to allow the bucket to fill without confining the air, and to escape freely on reaching the position of discharge.

Fig 6958.

Ventilating Water-Wheel.

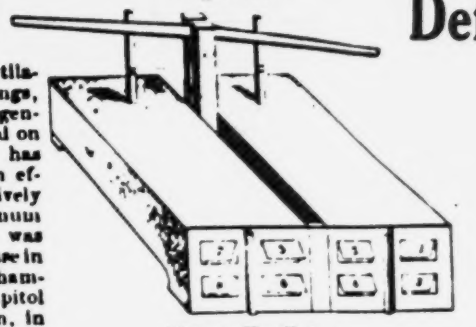
It appears to have been first introduced in Scotland, and to have been suggested by the violent eruption of water incident to the confining of the air in the bucket, in some cases forcing a spray to the hight of 6 or 8 feet. The arrows mark the course of the escaping air, from *a* to *b*.

Ven'ti-la'tor. An arrangement for supplying fresh and removing vitiated air from buildings, mines, or other places. This may be effected either by withdrawing the foul air and permitting the fresh air to flow in and supply its place (the *vacuum* process); or by forcing in fresh air (the *plenum* process), which drives the foul air before it to the exit. A combination of both processes is also used in certain cases.

In 1723, Dr. Desaguliers introduced a plan for ventilating the House of Commons by means of fires in upper apartments, which drew the air upward through openings at each angle of the House, whence it was conducted to the chimneys. This plan was not permitted to have a fair trial, and was succeeded by the centrifugal fan, invented by Desaguliers in 1734. One of these was erected over the ceiling of the House, and continued to do duty until 1817, being subsequently superseded by the [illegible] constructed by the Marquis de Chabannes.

About the same period, Sutton proposed to ventilate ships by pipes leading from the well and other parts of the vessel to the galley fire, which was to receive its sole supply of air through these tubes.

Fig. 6959.



Hales's Ventilator.

1. The ventilation of buildings, though more generally conducted on the exhaust, has sometimes been effected exclusively on the plenum principle, as was formerly the case in the Senate Chamber of the Capitol at Washington, in which a combination of both methods is now adopted. General Morin, Director of the Imperial Conservatory of Arts and Trades under the late French Empire, an authority in matters of this kind, gives a decided preference to the vacuum method, for the reasons that the vitiated air is more certainly withdrawn than it can be when expelled by forcing, and on account of the machinery necessarily employed, requiring skilled labor to attend it, which is indispensable in the latter method; while the former, requiring only the same number and arrangement of air-ducts, may be effected simply by the aid of heat.

General Morin indorses the following table, by some considered excessive, of the proper hourly supply of air required for each person in various situations: —

	CUBIC FEET.
Schools, each child, per hour	400 to 500.
Schools, each adult, per hour	800 to 1,000.
Meeting halls, for each person, per hour	1,000 to 2,000.
Theaters, for each person, per hour	1,400 to 1,700.
Prisons, for each person, per hour	1,700
Workshops, ordinary trades, for each person, per hour	2,000
Workshops, unhealthy trades, for each person, per hour	3,500
Ordinary hospitals	2,000 to 2,400.
Hospitals for epidemic cases	5,000

The temperature in general should not exceed, for

Workshops	50° Fah.
Hospitals	61° to 64° Fah.
Schools	66° to 68° Fah.
Meeting-rooms	66° to 72° Fah.
Theaters	68° to 73° Fah.

The air may be maintained at a higher temperature in well-ventilated apartments than in those where it is not frequently renewed.

Ordinarily, the fires by which the building is heated are wholly or principally relied on to effect the required renewal of the air. Dr. Arnott's plan, 1838, consists in cutting an opening in the chimney above the grate or fireplace, and providing this opening with a valve which opens inwardly to the flue, so as to draw off the foul air from the upper part of the apartment while preventing the entrance of smoke.

The plan of the Marquis de Chabannes, employed at the Covent Garden Theater, 1819, consisted in using the large central chandelier as the principal ventilating-agent. This was surmounted by an inverted wrought-iron funnel which conducted the hot air into a wooden shaft surmounted by a cowl. Air-passages leading from various parts of the house conducted the foul air into this shaft. A furnace in one of the galleries, and another over the stage, were employed as auxiliaries.

Previous to November, 1870, the Senate Chamber in the Capitol at Washington was ventilated upon the plenum principle exclusively, no exhaust being employed. The fan used for forcing is 14 feet in diameter, moved by an engine of 16 horse-power, delivers 500 cubic feet of air per revolution, and is capable of being run at a speed of 80 revolutions per minute, which is the maximum required for summer ventilation. The upper doorways and the openings in the ceiling were relied on to discharge the vitiated air. The fresh air was introduced through openings at the lower part of the chamber. Owing to

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R

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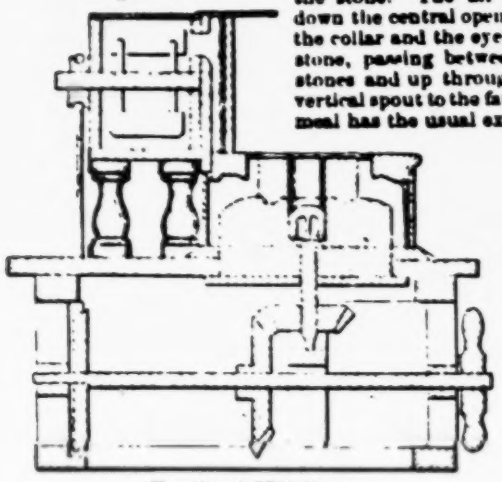

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See "A Course of Experimental Philosophy," by J. F. Desaguliers, LL. D., F. R. S., Chaplain to his Grace the Duke of Chandos London, 1734.

About 1741, or shortly after the invention of the fan-blower by Desaguliers, the Rev. Dr. Hales contrived a ventilator which he endeavored to introduce into the British navy. It worked on the bellows principle, and was composed of two oblong boxes, each of which had a valve moved up and down by rods attached to a lever working on a central pin. Air was drawn into the machine through inwardly opening valves, and expelled by valves opening outwardly. It required the labor of two by the, was to receive its sole supply of air through these tubes.

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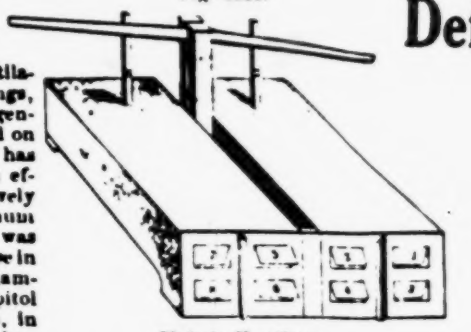

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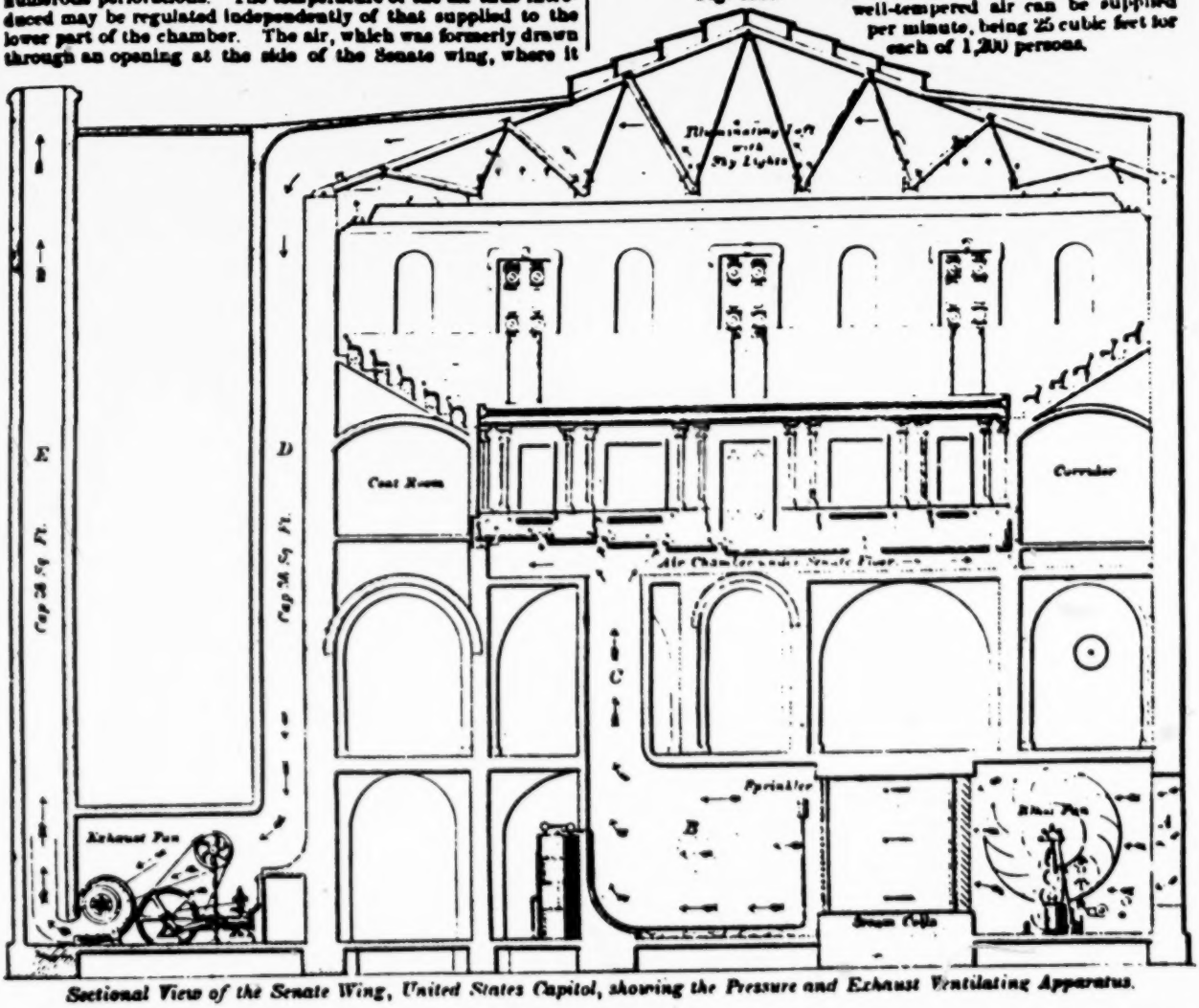
The plan of the Marquis de Chabannes, employed at the Covent Garden Theater, 1819, consisted in using the large central chandelier as the principal ventilating-agent. This was surmounted by an inverted wrought-iron funnel which conducted the hot air into a wooden shaft surmounted by a cowl. Air-passages leading from various parts of the house conducted the foul air into this shaft. A furnace in one of the galleries, and another over the stage, were employed as auxiliaries.

Previous to November, 1870, the Senate Chamber in the Capitol at Washington was ventilated upon the plenum principle exclusively, no exhaust being employed. The fan used for forcing is 14 feet in diameter, moved by an engine of 16 horse-power, delivers 500 cubic feet of air per revolution, and is capable of being run at a speed of 80 revolutions per minute, which is the maximum required for summer ventilation. The upper doorways and the openings in the ceiling were relied on to discharge the vitiated air. The fresh air was introduced through openings at the lower part of the chamber. Owing to defects and contractions in the main induction channel and the distribution passages, however, the requisite quantity of air could not be supplied without causing a strong current on the floor. The speed of the fan had accordingly to be reduced so as to give only about ½ the quantity of air required. To remedy this defect, two large exhaust-fans driven by a 25 horse-power engine were erected; these draw the air through perforations in the ceiling into the illuminating loft above, thence downward through two descending shafts having a sectional area of 36 square feet into the exhaust-chamber, whence it is discharged through a single upcast shaft having a sectional area equal to

that of the other two combined. A second air-shaft was constructed, leading from the chamber in which the air is either heated or cooled, according to the season, to an air space under the seats of the galleries, into which it is distributed through numerous perforations. The temperature of the air thus introduced may be regulated independently of that supplied to the lower part of the chamber. The air, which was formerly drawn through an opening at the side of the Senate wing, where it was liable to be contaminated by smoke and gas from the neighboring flues, now passes through a tunnel 250 feet long, the mouth of which is located in a position free from these contaminating influences. By these means, 30,000 cubic feet of pure and well-tempered air can be supplied per minute, being 25 cubic feet for each of 1,200 persons.

Fig. 6960.

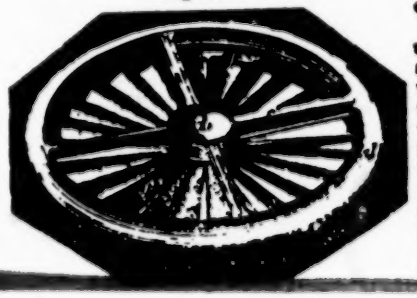


Sectional View of the Senate Wing, United States Capitol, showing the Pressure and Exhaust Ventilating Apparatus.

Fig. 6960 is a transverse section of the Senate wing, United States Capitol, illustrating the mode of warming and ventilating the Senate Chamber.

Fresh air is drawn in through an opening *A* in the basement wall by means of two powerful steam-driven blast-fans, which force it through a series of steam-coils into a chamber *B*, where it is charged with aqueous vapor by a sprinkler. It thence ascends through an upcast *C* into an air-chamber beneath the Senate floor, and is admitted into the apartment through registers in the floor and at the sides. Rising to the upper part of the hall, it passes through apertures between the skylights into the illuminating loft, whence it is drawn downward through a descending shaft *D*, having a sectional area of 36 square feet, by steam-driven exhaust-fans, and finally discharged into the open air through an ascending shaft *E* of equal capacity.

Fig. 6961.

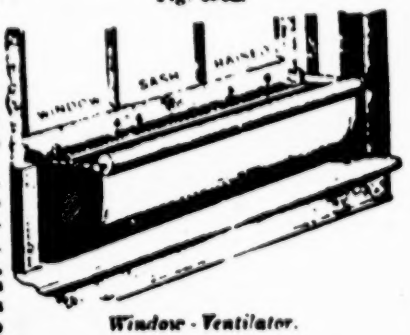


The *ventilator for windows* consists of a wheel with spiral vanes, which is rotated by the outward passage of air from the room. It is usually set in a pane of glass, or occupies the site of a pane

Fig. 6961 is a rotary ventilator for

b b' attached to the arms *c c'* of the case *d*. A hole of sufficient size is cut in a window-pane, the case inserted and held by the flanges *e e'* and tongues *f f'*, which are turned up for the purpose.

Fig. 6962.



Window-Ventilator.

Or a curved chute placed at the opening formed by a raised sash to direct the air upward into a room.

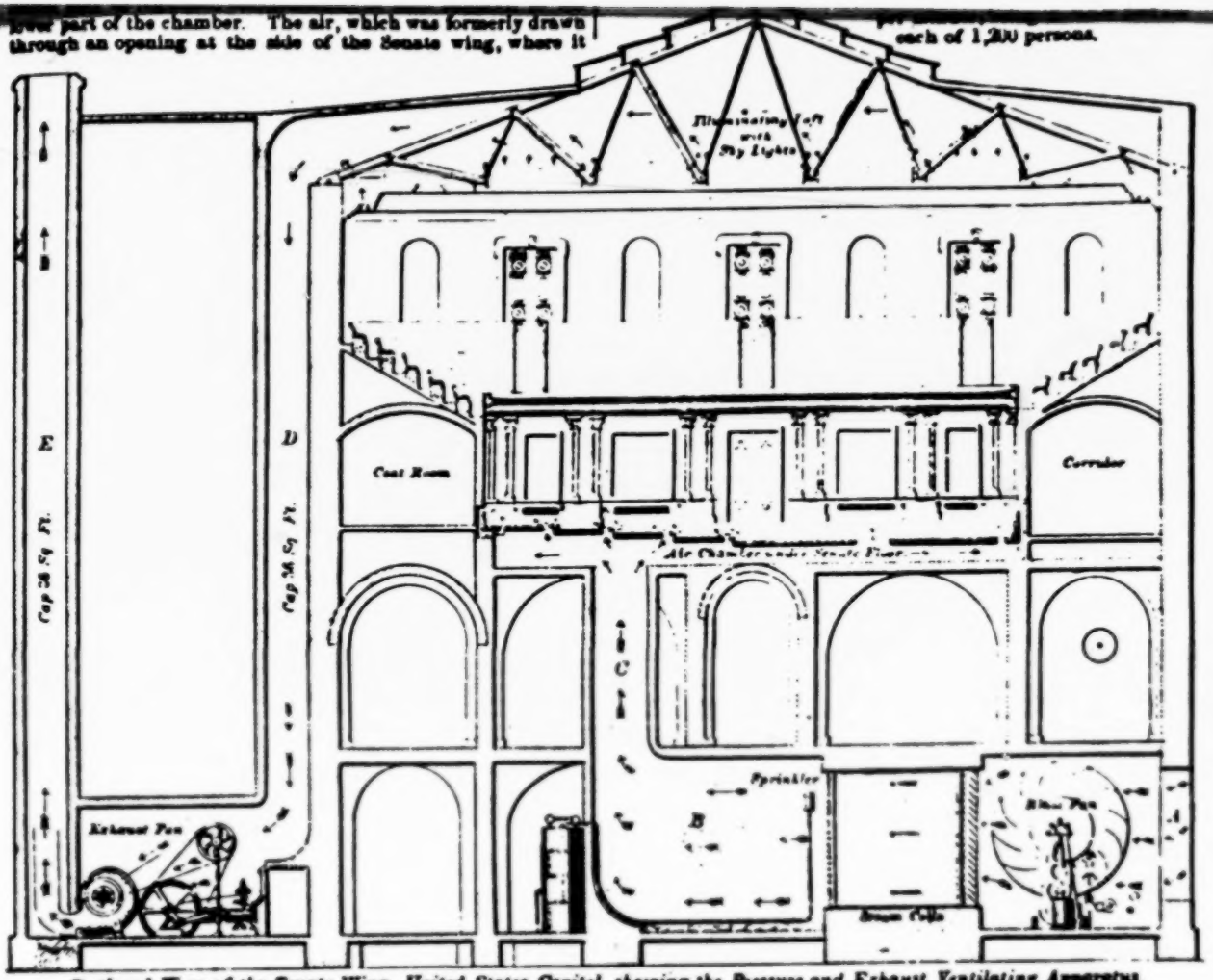
Or a louver arrangement in a pane of glass, or occupying the place of one.

The ventilator, Fig. 6963, consists of a frame which is held between the lower bar of the sash and the sill of the window-frame, and has two elbowed pipes, whose inner ends are vertical, so as to direct the cool air from out doors upwardly into the apartment. The pipes are provided with valves for regulating the quantity of air admitted, or shutting it off altogether.

Fig. 6963

lower part of the chamber. The air, which was formerly drawn through an opening at the side of the Senate wing, where it

each of 1,200 persons.



Sectional View of the Senate Wing, United States Capitol, showing the Pressure and Exhaust Ventilating Apparatus.

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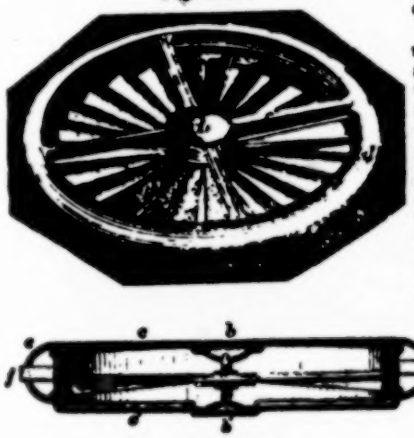
Fig. 6961.

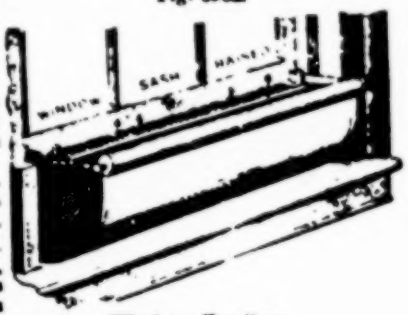


Ventilator.

The *ventilator for windows* consists of a wheel with spiral vanes, which is rotated by the outward passage of air from the room. It is usually set in a pane of glass, or occupies the site of a pane.

Fig. 6961 is a rotary ventilator for apartments. The wheel *a*, which has a number of radial vanes, is stamped out of sheet-metal, and is journaled in bearings upon disks *b b'* attached to the arms *c c'* of the case *d*. A hole of sufficient size is cut in a window-pane, the case inserted and held by the flanges *e e'* and tongues *f f'*, which are turned up for the purpose.

Fig. 6962.



Window-Ventilator.

Or a curved chute placed at the opening formed by a raised sash to direct the air upward into a room.

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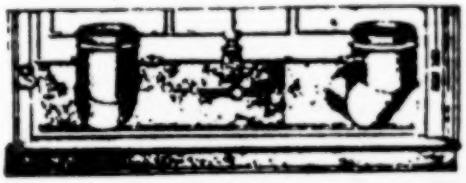
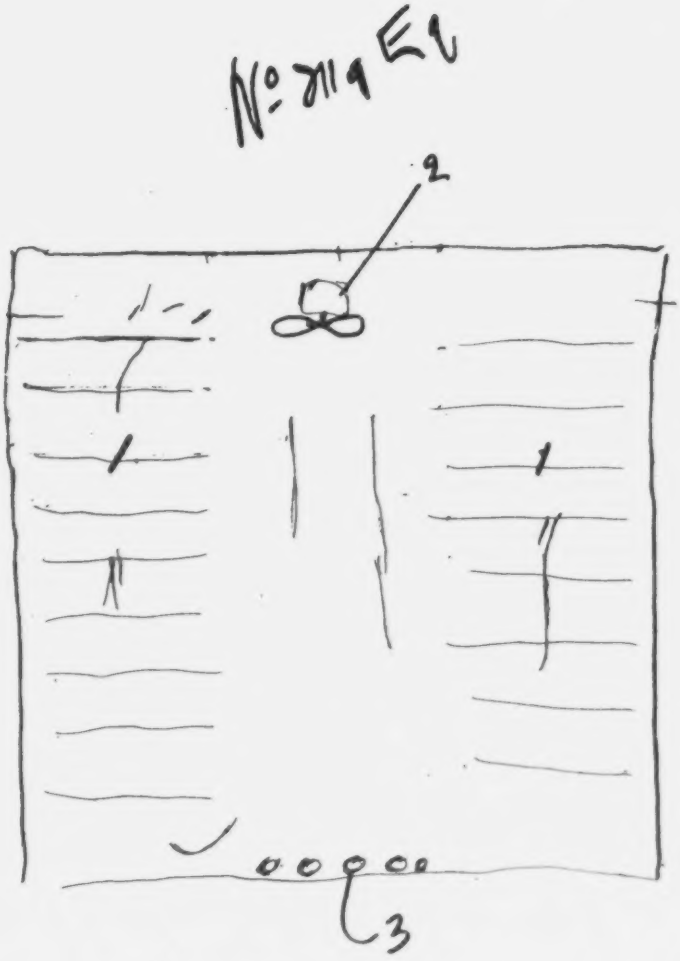
The ventilator, Fig. 6963, consists of a frame which is held between the lower bar of the sash and the sill of the window-frame, and has two elbowed pipes, whose inner ends are vertical, so as to direct the cool air from out doors upwardly into the apartment. The pipes are provided with valves for regulating the quantity of air admitted, or shutting it off altogether.

Fig. 6963.



Ventilator.

Defendant's Exhibit S



946 (Defendants' Exhibit T, Letters Patent No. 535,175 to C. W. Schwartz, Jr., March 5, 1895.)

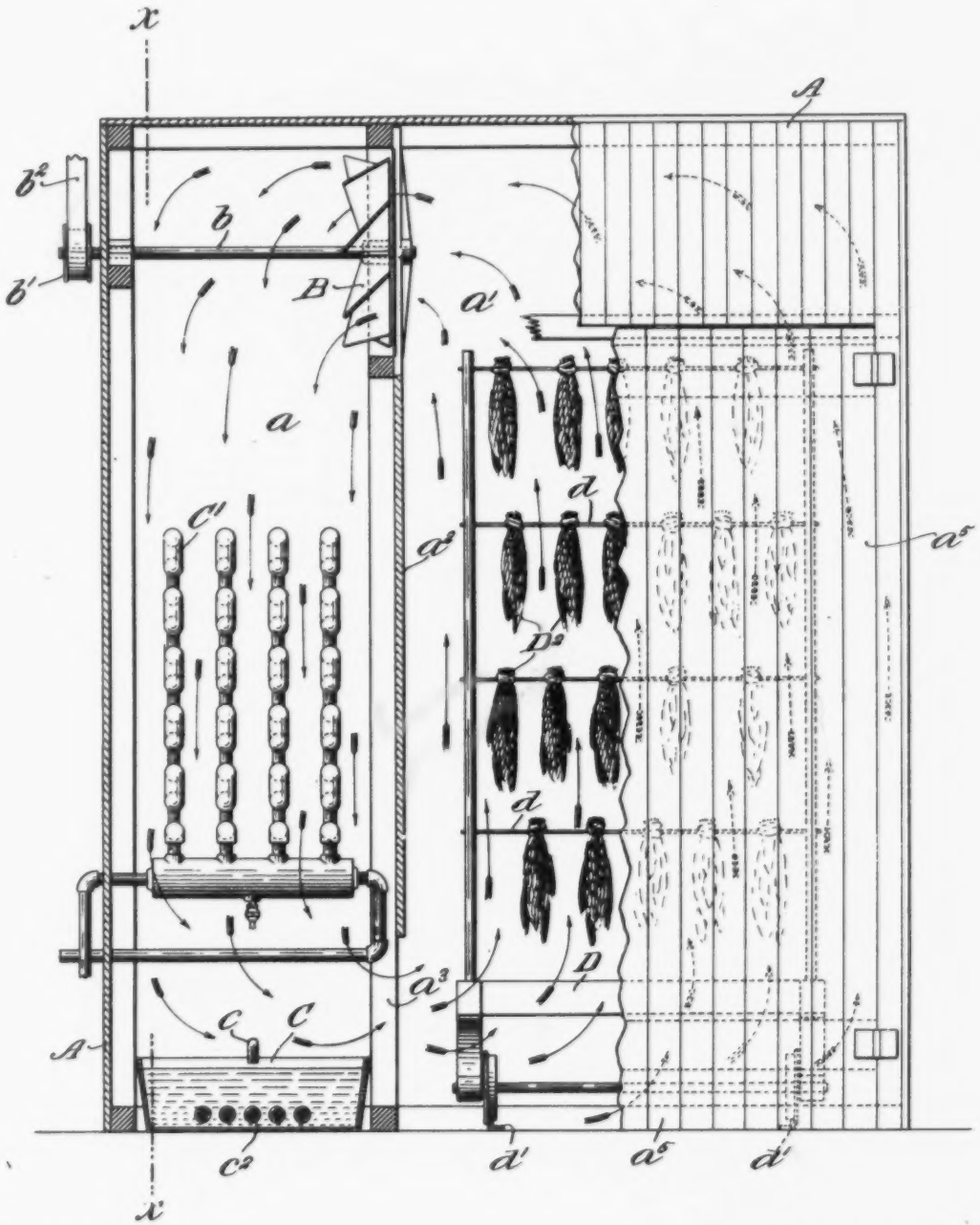
(No Model.) 6 Sheets—Sheet 1.

C. W. SCHWARTZ, Jr.

METHOD OF AND APPARATUS FOR ORDERING TOBACCO.

No. 535,175. Patented Mar. 5, 1895.

Fig: 1



Witnesses:
Thomas M. Smith,
Richard E. Harwell.

Inventor:
Charles W. Schwartz Jr.,
By J. Walter Douglas.
Attorney.

820

(No Model.) 6 Sheets—Sheet 2.

C. W. SCHWARTZ, Jr.

METHOD OF AND APPARATUS FOR ORDERING TOBACCO.

No. 535,175. Patented Mar. 5, 1895.

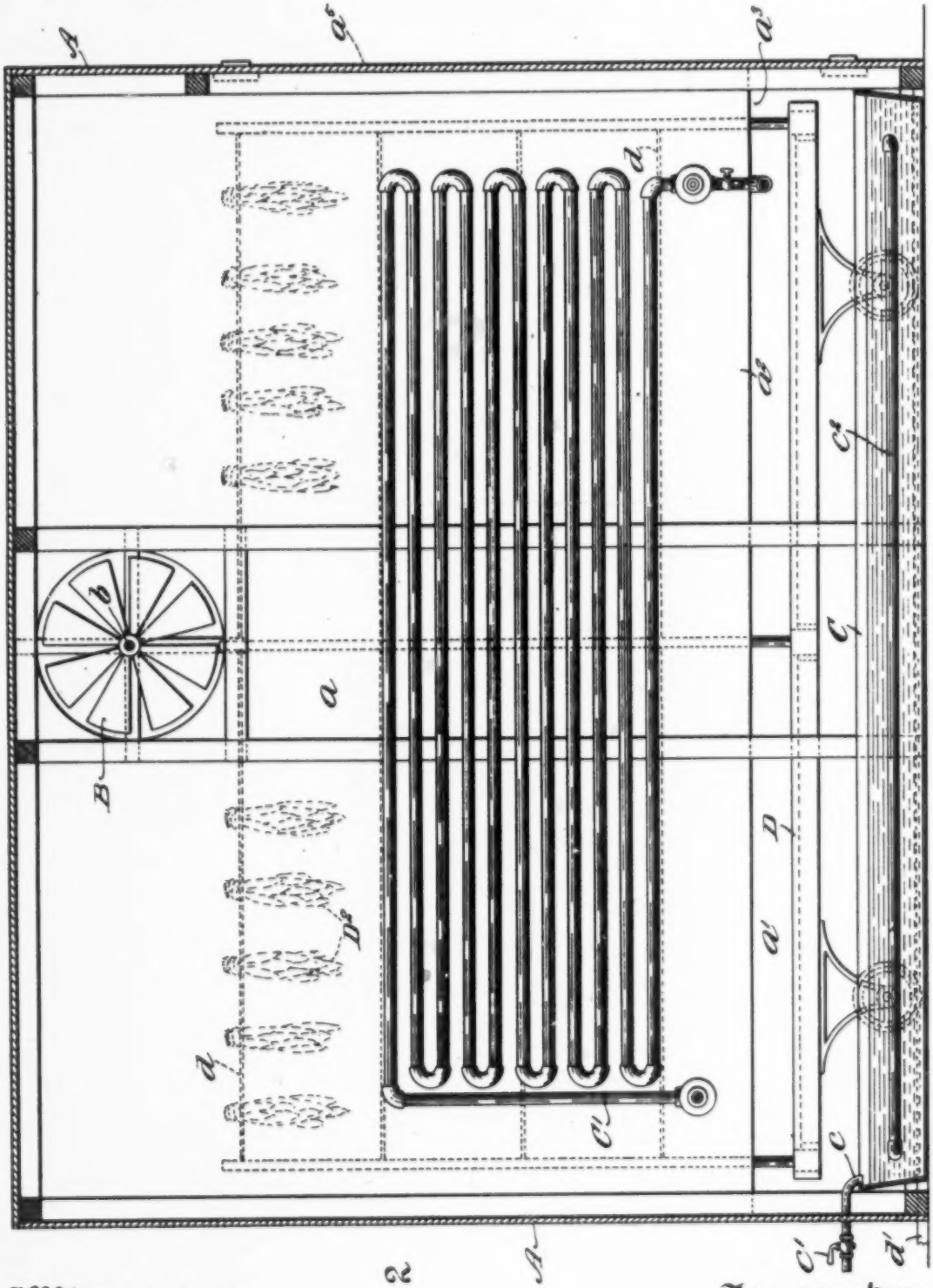


Fig. 2.

Witnesses:
Thomas M. Smith,
Richard C. Maxwell.

Inventor:
Charles W. Schwartz Jr.,
By J. Walter Douglass.
Attorney.

822

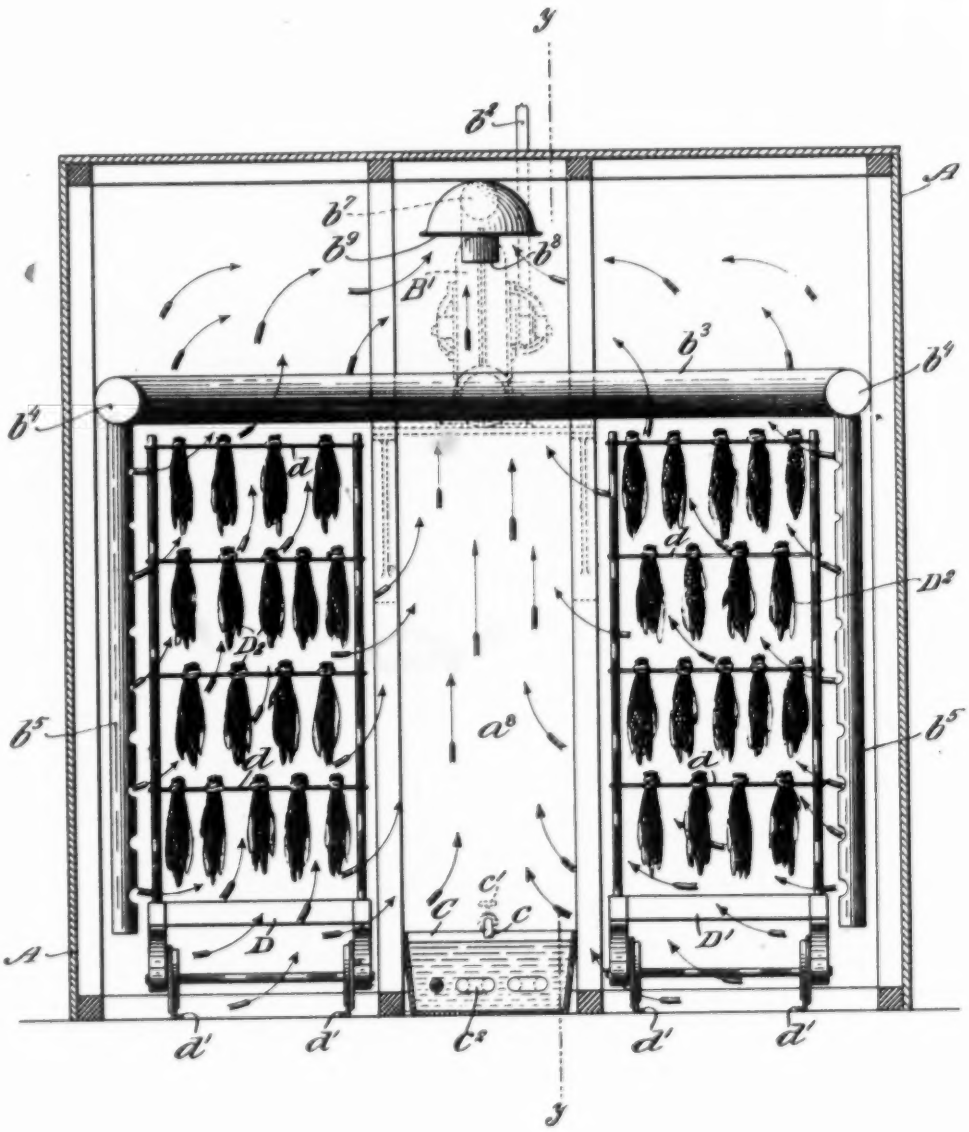
(No Model.) 6 Sheets—Sheet 3.

C. W. SCHWARTZ, Jr.

METHOD OF AND APPARATUS FOR ORDERING TOBACCO.

No. 535,175. Patented Mar. 5, 1895.

Fig. 3



Witnesses:
Thomas M. Smith.
Richard C. Maxwell.

Inventor.
Charles W. Schwartz Jr.
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Attorney.

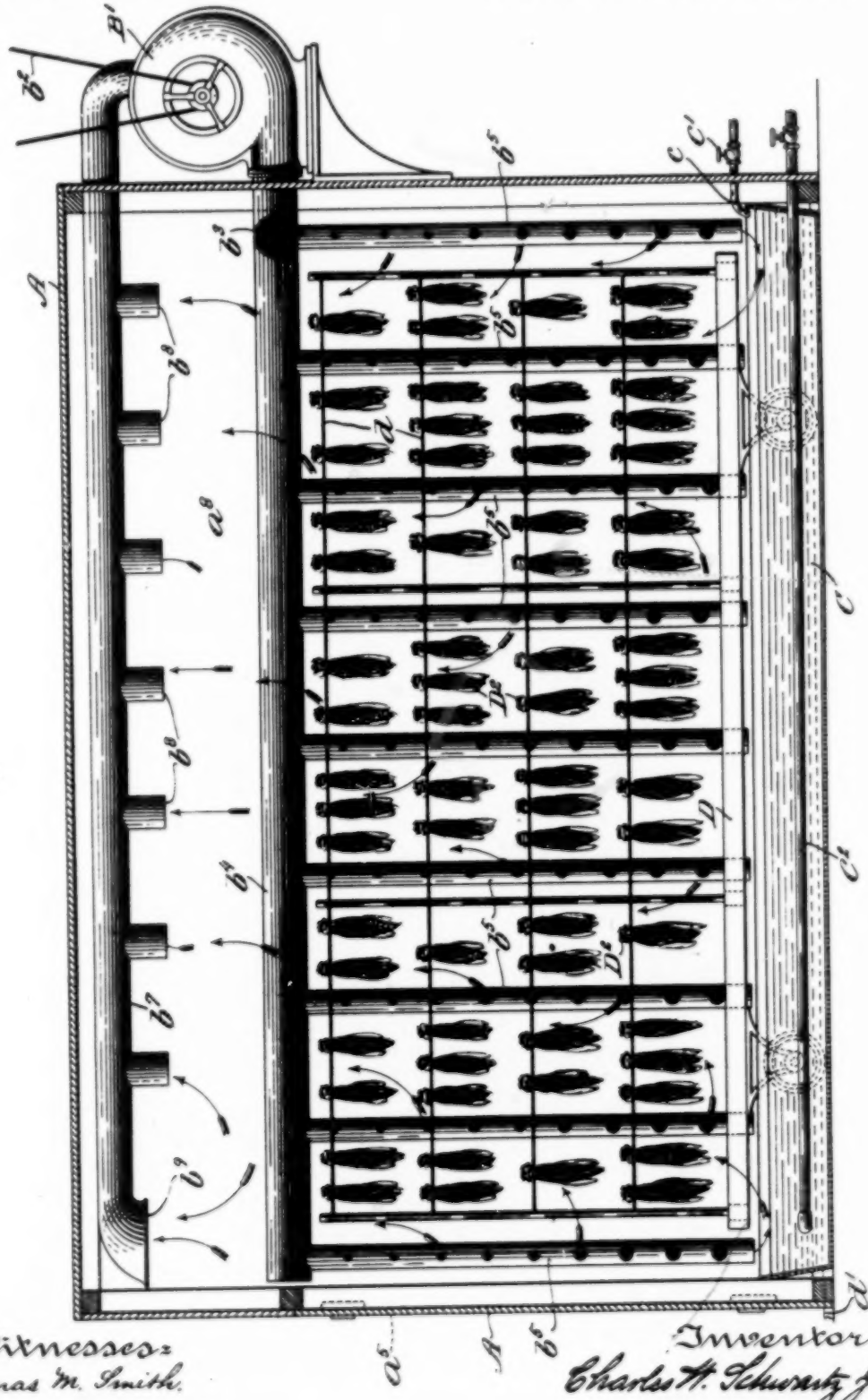
824 (No Model.) 6 Sheets—Sheet 4.

C. W. SCHWARTZ, Jr.

METHOD OF AND APPARATUS FOR ORDERING TOBACCO.

No. 535,175. Patented Mar. 5, 1895.

Fig. 6.



Witnesses:
Thomas M. Smith.
Richard C. Maxwell.

Inventor.
Charles W. Schwartz Jr.,
By J. Walter Douglass
Attorney.

826

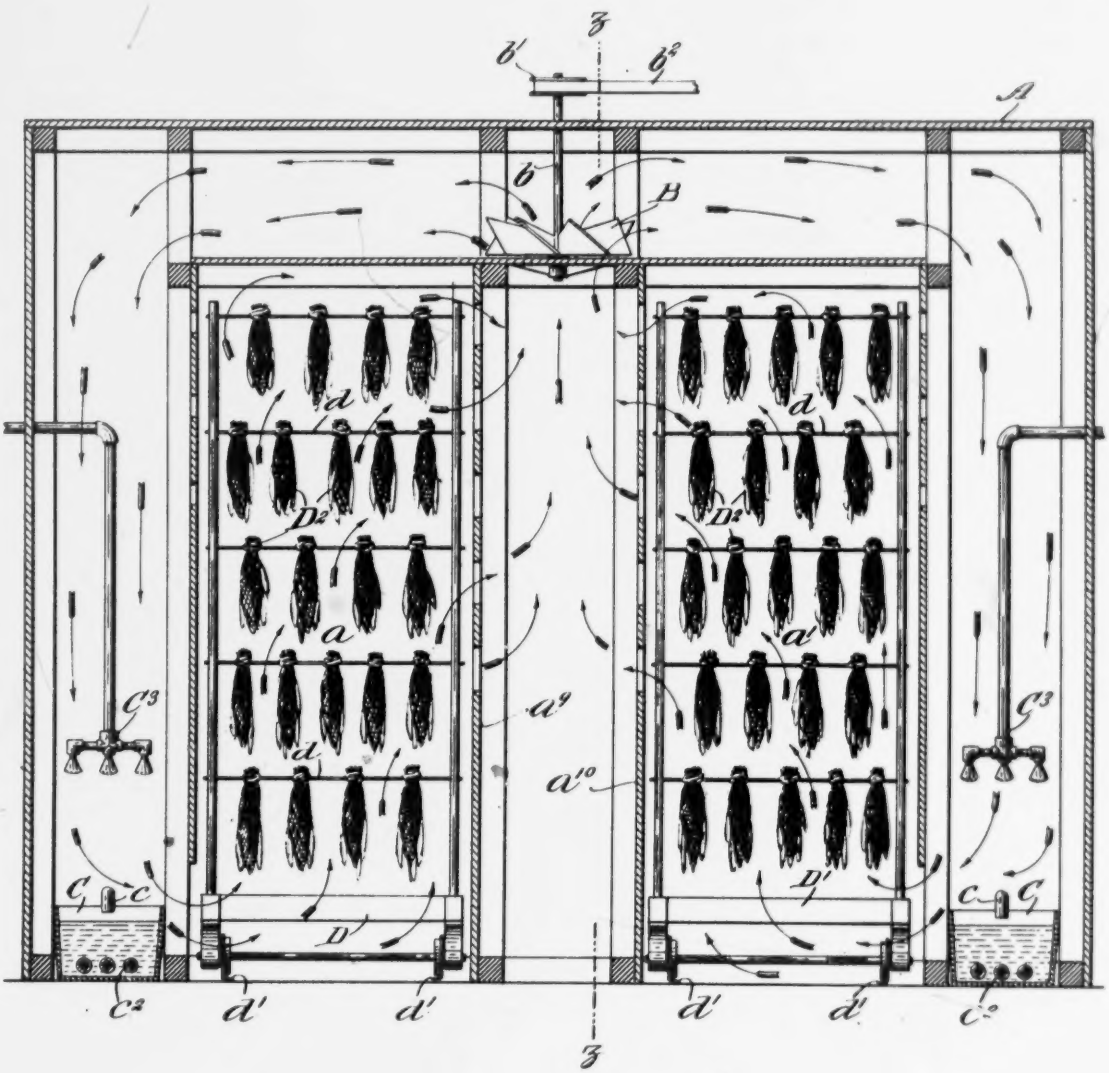
(No Model.) 6 Sheets—Sheet 5.

C. W. SCHWARTZ, Jr.

METHOD OF AND APPARATUS FOR ORDERING TOBACCO.

No. 535,175. Patented Mar. 5, 1895.

Fig. 5



Witnesses:
Thomas M. Smith,
Richard C. Maxwell.

Inventor.
Charles W. Schwartz Jr.
By J. Walter Douglass
Attorney.

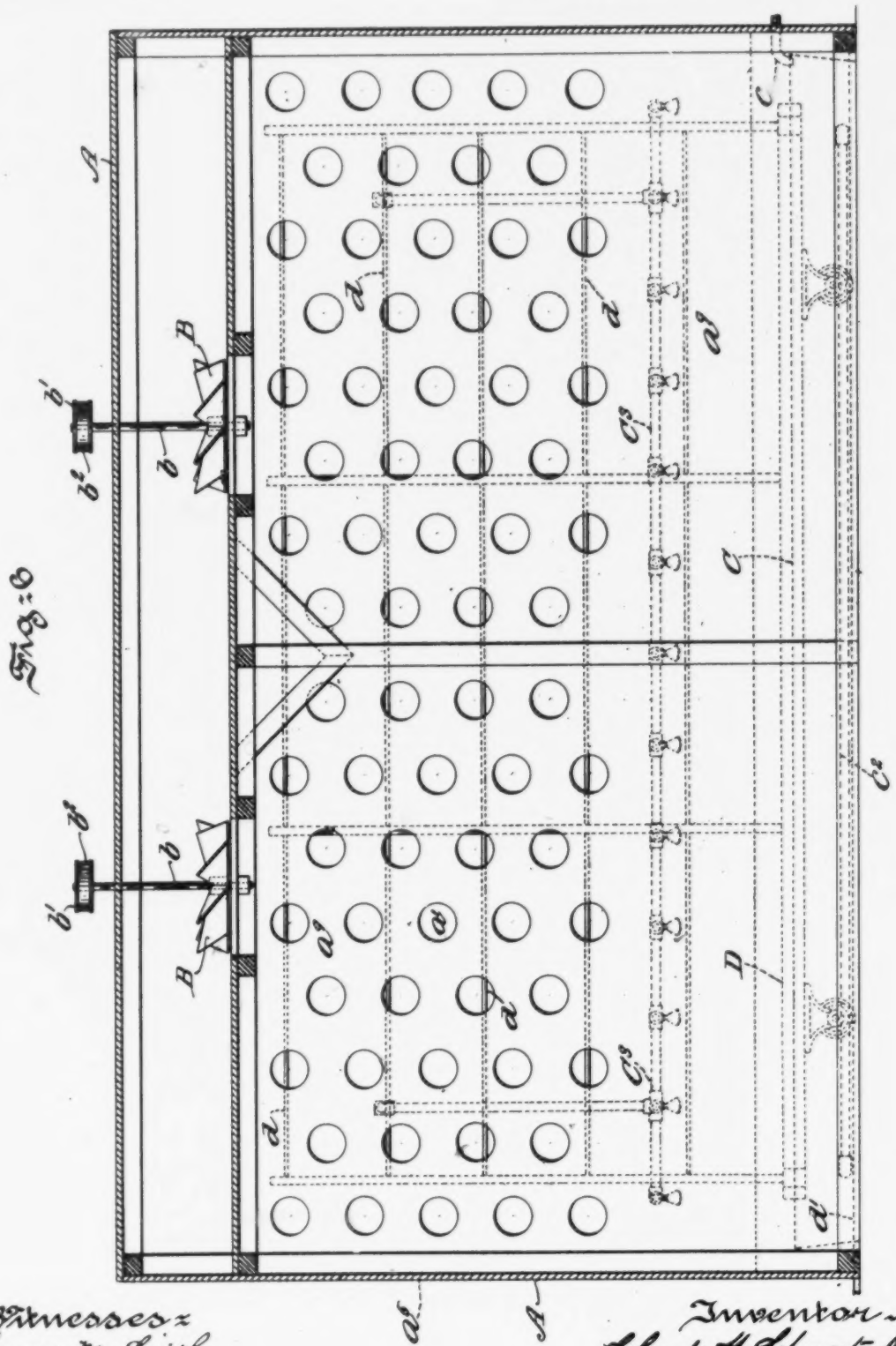
828

(No Model.) 6 Sheets—Sheet 6.

C. W. SCHWARTZ, Jr.

METHOD OF AND APPARATUS FOR ORDERING TOBACCO.

No. 535,175. Patented Mar. 5, 1895.



Witnesses:
Thomas M. Smith,
Richard C. Maxwell.

Inventor:
Charles W. Schwartz, Jr.,
By J. Walter Douglass.
Attorney.

UNITED STATES PATENT

CHARLES W. SCHWARTZ, JR., OF PHILADELPHIA, PENNSYL
TO THE PHILADELPHIA TEXTILE MACHINERY COMPANY,

METHOD OF AND APPARATUS FOR ORDERING

SPECIFICATION forming part of Letters Patent No. 535,175, dated

Application filed November 6, 1894. Serial No. 528,041. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. SCHWARTZ, Jr., a citizen of the United States, residing at Germantown, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Methods of and Apparatus for Ordering Tobacco, of which the following is a specification.

My invention relates to a method of and apparatus for ordering tobacco.

The principal objects of my invention are, first, to provide a simple and effective method of hastening the ordering of tobacco so that any tendency to scorching or scalding of the same is entirely prevented and the tobacco rendered sweet in taste and subsequent handling permitted with perfect safety and without fear of crushing the leaves thereof; second, to provide an efficient method of ordering tobacco by circulation and recirculation, which consists in presenting air of one temperature to water of a different temperature in a chamber to cause the latter to be combined so as to produce a humid atmosphere which is forced into the presence of the tobacco absorbing the humidity of the air and again conveying the same into the presence of water to revivify the same and presenting to the tobacco to effect the complete ordering thereof, and, third, to provide suitable apparatus for the conduct of the method of ordering tobacco of my invention.

My invention stated in general terms comprises a method of ordering tobacco by circulation and recirculation which consists in presenting air of one temperature in the path of water of a different temperature to produce a humid atmosphere and presenting to suspended tobacco in such manner as to cause an absorption of the humidity of the air thereby and conveying the air deprived of its humidity to water to supply the same with humidity and presenting again to the tobacco to effect complete or thorough ordering of the same.

My invention further consists in the method of ordering tobacco, of forcing air of one temperature into the presence of water of higher temperature to produce a humid atmosphere and presenting to tobacco, which absorbs humidity therefrom, then
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My invention further
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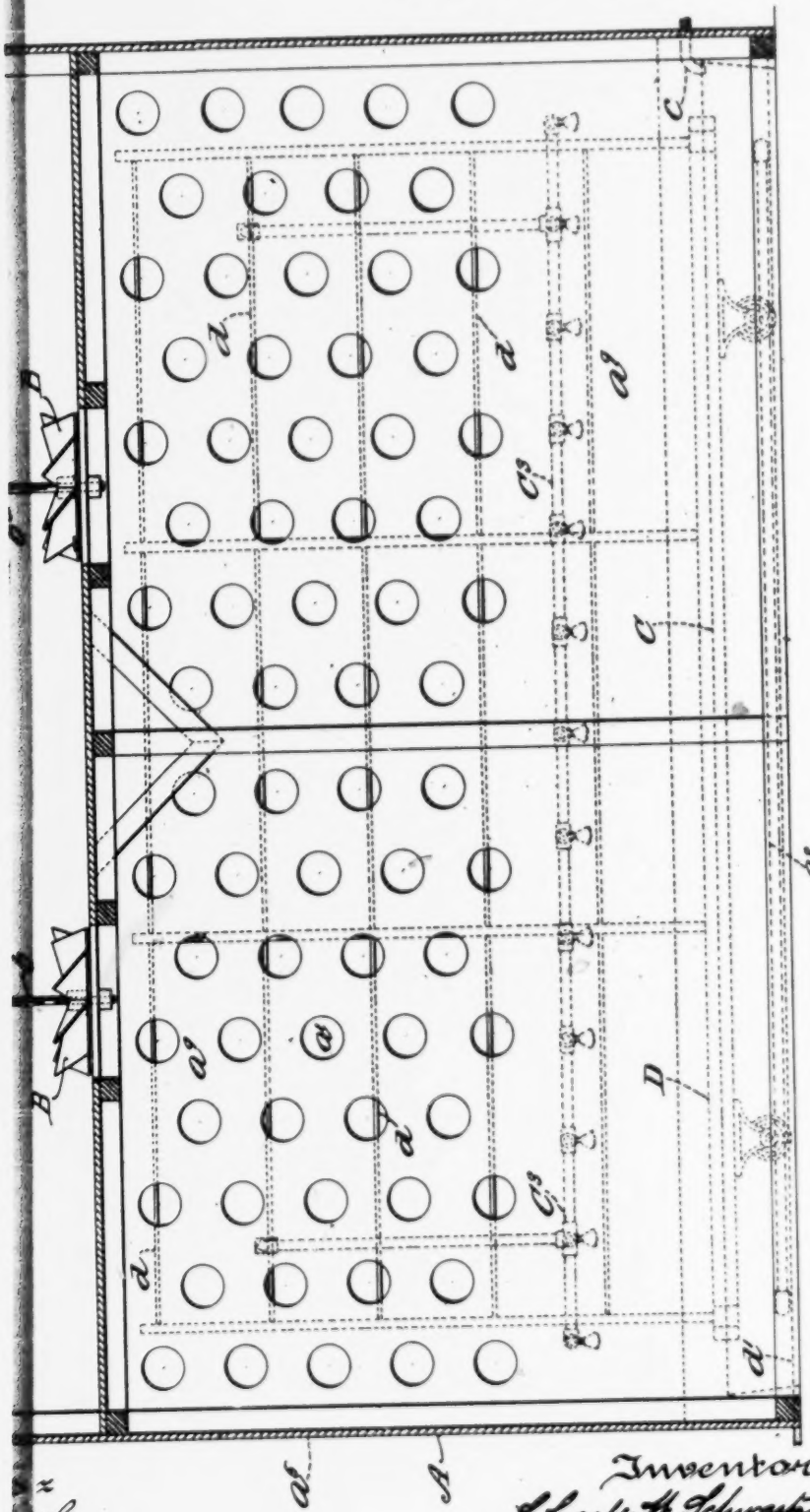
6 Sheets—Sheet 6.

C. W. SCHWARTZ, Jr.

OD OF AND APPARATUS FOR ORDERING TOBACCO.

6.

Patented Mar. 5, 1895.



Inventor-
Charles W. Schwartz Jr.
By J. Walter Douglass.
Attorney.

UNITED STATES PATENT OFFICE.

CHARLES W. SCHWARTZ, JR., OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE PHILADELPHIA TEXTILE MACHINERY COMPANY, OF SAME PLACE.

METHOD OF AND APPARATUS FOR ORDERING TOBACCO.

SPECIFICATION forming part of Letters Patent No. 535,175, dated March 5, 1895.

Application filed November 6, 1894. Serial No. 528,041. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. SCHWARTZ, Jr., a citizen of the United States, residing at Germantown, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Methods of and Apparatus for Ordering Tobacco, of which the following is a specification.

My invention relates to a method of and apparatus for ordering tobacco.

The principal objects of my invention are, first, to provide a simple and effective method of hastening the ordering of tobacco so that any tendency to scorching or scalding of the same is entirely prevented and the tobacco rendered sweet in taste and subsequent handling permitted with perfect safety and without fear of crushing the leaves thereof; second, to provide an efficient method of ordering tobacco by circulation and recirculation, which consists in presenting air of one temperature to water of a different temperature in a chamber to cause the latter to be combined so as to produce a humid atmosphere which is forced into the presence of the tobacco absorbing the humidity of the air and again conveying the same into the presence of water to revivify the same and presenting to the tobacco to effect the complete ordering thereof, and, third, to provide suitable apparatus for the conduct of the method of ordering tobacco of my invention.

My invention stated in general terms comprises a method of ordering tobacco by circulation and recirculation which consists in presenting air of one temperature in the path of water of a different temperature to produce a humid atmosphere and presenting to suspended tobacco in such manner as to cause an absorption of the humidity of the air thereby and conveying the air deprived of its humidity to water to supply the same with humidity and presenting again to the tobacco to effect complete or thorough ordering of the same.

My invention further consists in the method of ordering tobacco, of forcing air of one temperature into the presence of water of higher temperature to produce a humid atmosphere and presenting to tobacco, which absorbs humidity therefrom, then presenting to water to revivify the same and under pressure forcing again into the presence of the tobacco to effect the complete ordering thereof.

My invention further consists of the method of ordering tobacco by circulation and recirculation, which consists in subjecting air brought to a low temperature into the presence of water maintained at a high temperature to produce a humid atmosphere and presenting continuously to tobacco and successively to water to permit of absorption in the one instance by the tobacco of the humidity of the air and in the other of the supply of the air with humidity so as to again present to the tobacco to effect the complete ordering thereof.

My invention further consists of suitable apparatus for the conduct of the method of ordering tobacco of my invention, constructed and arranged in substantially the manner hereinafter described and claimed.

The nature and general features of my invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, and in which—

Figure 1, is a central vertical section through one form of apparatus embodying features of my invention, and such as in practice has been found well adapted for the conduct of the method of ordering tobacco of my invention. Fig. 2, is a longitudinal section through the apparatus on the line x—x, of Fig. 1. Fig. 3, is a vertical central section through a modified form of apparatus to that of Fig. 1, for carrying into effect the method of my invention. Fig. 4, is a vertical longitudinal section on the line y—y, of Fig. 3. Fig. 5, is a vertical central section through a still further modified form of apparatus of my invention; and Fig. 6, is a vertical longitudinal section on the line z—z, of Fig. 5.

Referring to the drawings A, is a housing provided with internal chambers a and a', partially separated from each other by a partition a^3, with reference to Figs. 1 and 2, of the drawings. In the partition a^3, the upper portion thereof is provided an opening, into which is mounted a propeller fan or agi-

tating device B, mounted on a cross shaft b which extends through the housing A, and carries a pulley b', and a belt b^2, for effecting the rotation of the said fan or agitating device B.

a^3, is an opening in the lower portion of said partition a^2, for a purpose to be presently explained.

In the bottom of the chamber a, is mounted an oblong trough or tank C, adapted to contain water introduced into the same by means of a spigot c, having a stop-cock c'. In the bottom of the trough or tank C, is provided a coiled pipe c^2, for heating the water therein in such manner as that the same will be maintained at a higher temperature than the air caused to circulate around or about the water of this trough C. Above the tank or trough C, is provided a cooling or refrigerating coiled or other appliance C', for reducing the temperature of the air caused to circulate in the chambers of the housing A, and so that it may be maintained at such a temperature as to intimately blend or combine with the water of a higher temperature traveling in the path thereof and thereby producing the required humid atmosphere for presenting by circulation and recirculation to the tobacco to be absorbed by it in whole or in part to dampen and order the same.

D, is a truck adapted to be introduced into the chamber a', and provided with cross rods d, for supporting bunches of tobacco D^3, therefrom.

d', are rails over which the truck is moved into and out of the housing A, through a door a^5, provided in one of the side or end walls of the same.

In the operation of the apparatus of Figs. 1 and 2, the air is forced by means of the propeller or agitating device B, into the chamber a, and the temperature of the water in the chamber a, being raised by means of the steam coil c^2, so as to cause the air therein freed from the agitating influence of said device D, and in a more or less calm state and brought to and maintained at a lower temperature than the water by the cooling or refrigerating appliance C', in the chamber a, and until it is caused to associate with the water to produce a humid atmosphere in the chamber a, of the housing A, and which after the starting up of the apparatus is continuously conducted through the chambers a and a', into the presence of the tobacco D^3, in the latter chamber a', and the humidity of the air is absorbed by the tobacco suspended from the truck D, therein and under the influence of the propeller fan or agitating device B, the air having the humidity dissociated therefrom is carried back again into the chamber a, where it becomes again a humid atmosphere and is conveyed into the presence of the tobacco to effect first the moistening or dampening of the surface or body thereof and by continuous circulation and recirculation of the air supplied with moisture, complete ordering of the tobacco.

With reference to Figs. 3 and 4, the apparatus is substantially the same as that of Figs. 1 and 2, with the following exceptions:—The blowing or agitating device B', in the present instance, is provided with a transverse conduit b^3, extending substantially the width of the housing A, and connected therewith are longitudinal pipes or conduits b^4, on each side provided with depending perforated pipes b^5, as clearly illustrated in Fig. 4. Within the housing A, are mounted two trucks D and D', on rails d', secured to the floor thereof, and with a water tank or trough C, located in a central chamber a^2, and having a heating coil extending through the tank or trough for not only heating, but also maintaining the water therein at a different temperature from that of air caused to circulate through the internal chambers of the housing A, and becoming associated with the water to produce a humid atmosphere, for being presented to the tobacco in bunch or other form suspended from the trucks D and D', as fully illustrated in Fig. 3.

b^7, is a pipe or conduit located beneath the roof of the housing on the inside thereof and connected with the rear of the blowing device B'. This pipe or conduit b^7, is provided with a series of depending inlets b^8, and at the left hand end thereof is provided a large inlet or throat b^9, for sucking air into the same deprived of its moisture or humidity through its absorption by the tobacco and which air is also drawn through the series of inlets b^8, of said conduit b^7, thereby and conducted rearwardly into the blowing device B', and by which latter means the air is again conveyed through the transverse conduit b^3, and then longitudinally and downwardly through the perforated depending pipes or conduits b^4 and b^5, in such manner as that the presence of the air of one temperature from said perforated pipes b^5, on both sides of the interior of the housing, then in a more or less calm state or condition, will be brought into the path of water in the tank or vat C, of a different temperature, thereby receiving moisture therefrom and thus converting the air into a humid atmosphere which is presented by circulation and recirculation to the tobacco suspended from the trucks D and D', to effect first moistening of the body or surface of the tobacco and then complete ordering of the same.

It may be here remarked that the cooling or refrigerating appliance may be in the nature of a sprayer or any other somewhat similar means to be further explained to reduce the temperature of air circulating in and about the interior of the housing below the temperature of the heated water of the tank or trough C.

With reference to Figs. 5 and 6, the apparatus therein differs from that hereinbefore described in the following particulars:—Instead of providing on the interior of the housing A, a series of depending perforated tubes

b^5, connected with pipes or conduits b^4, and with a main conduit b^3, in which air is conducted therethrough by means of a blowing device B', propeller fans B, as illustrated in Figs. 1 and 2, are employed in the top of the housing and the air is forced therefrom and thereby in different directions as indicated by the arrows in Fig. 5, and in a more or less calm state by this time, into the presence of water maintained at a different temperature from the air, so that the latter may effectually absorb the water and thus create a humid atmosphere for presenting to the tobacco supported from the trucks D and D', in the chambers a and a', which are separated from each other by means of partitions a^9 and a^{10}. These partitions are provided with staggered openings, as clearly illustrated in Fig. 5. The cooling or refrigerating appliance for reducing the temperature of circulating air in this instance is in the nature of a water sprayer or atomizer c^3, as fully illustrated in Figs. 5 and 6. In other respects the apparatus is the same as that hereinbefore fully explained and the devices associated with the apparatus operate in the same manner as they do with reference to Figs. 1 to 4, of the drawings.

It will be manifestly obvious to those skilled in the art to which my invention appertains that still further modifications as to details of construction of the apparatus and arrangement of the devices connected therewith may be made, without departing from the spirit and scope thereof; and hence I do not wish to be understood as limiting myself to the precise arrangements of all the parts of the apparatus as illustrated; but

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The method of ordering tobacco, which consists in continuously presenting air of one temperature in a chamber to water of another temperature to produce a humid atmosphere, conveying the same into the presence of tobacco to effect dampening thereof, and causing successively the air deprived of its humidity to be revivified and again presented to the tobacco to effect ordering thereof, substantially as described.

2. The method of ordering tobacco, which consists in forcing air into the presence of water of a temperature differing from the air to become associated therewith by producing a humid atmosphere, conveying the same to tobacco which absorbs the humidity thereof, conducting the air deprived of its humidity to the water to revivify the same and then presenting the air recharged with moisture to the tobacco to effect ordering thereof, substantially as described.

3. The method of ordering tobacco, which consists in presenting under pressure air of a low temperature to water of a high temperature to create a humid atmosphere, conveying the same to toba
presence of water and
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4. The method of
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6. An apparatus for
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ter, a cooling or refrig
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and recirculating air i
of said tank or troug
for the purposes descr

7. An apparatus for
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vice for circulating an
water tank or trough p
device, and means for
said housing, substan
purposes described.

8. An apparatus for
prising a housing provi
ed to contain water an
a different temperatur
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subjecting the same to
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9. An apparatus for
prising a housing havi
means for containing
chambers and a cooling
circulating and recircu
said housing in each in
being presented to the
supporting tobacco in
said housing, substan
purposes described.

10. An apparatus for c
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partitions thereof, a wat
heating means therein,

on a cross shaft b the housing A, and belt b^3, for effecting fan or agitating de-

lower portion of said e to be presently ex-

amber a, is mounted k C, adapted to con- to the same by means stop-cock c'. In the tank C, is provided ng the water therein e same will be main- erature than the air d or about the water e the tank or trough r refrigerating coiled r reducing the tem- ed to circulate in the A, and so that it may temperature as to in- ne with the water of raveling in the path ducing the required resenting by circula- the tobacco to be ab- r in part to dampen

to be introduced into ovided with cross rods es of tobacco D^3, there-

ch the truck is moved ing A, through a door he side or end walls of

e apparatus of Figs. 1 by means of the pro- ice B, into the cham- ure of the water in the by means of the steam air therein freed from of said device D, and in te and brought to and temperature than the refrigerating appliance nd until it is caused to er to produce a humid mber a, of the housing starting up of the ap- ly conducted through ', into the presence of latter chamber a', and air is absorbed by the m the truck D, therein ce of the propeller fan the air having the hu- erefrom is carried back er a, where it becomes phere and is conveyed he tobacco to effect first mpening of the surface by continuous circula- of the air supplied with ndering of the tobacco.

With reference to Figs. 3 and 4, the apparatus is substantially the same as that of Figs. 1 and 2, with the following exceptions:—The blowing or agitating device B', in the present instance, is provided with a transverse conduit b^3, extending substantially the width of the housing A, and connected therewith are longitudinal pipes or conduits b^4, on each side provided with depending perforated pipes b^5, as clearly illustrated in Fig. 4. Within the housing A, are mounted two trucks D and D', on rails d', secured to the floor thereof, and with a water tank or trough C, located in a central chamber a^2, and having a heating coil extending through the tank or trough for not only heating, but also maintaining the water therein at a different temperature from that of air caused to circulate through the internal chambers of the housing A, and becoming associated with the water to produce a humid atmosphere, for being presented to the tobacco in bunch or other form suspended from the trucks D and D', as fully illustrated in Fig. 3.

b^7, is a pipe or conduit located beneath the roof of the housing on the inside thereof and connected with the rear of the blowing device B'. This pipe or conduit b^7, is provided with a series of depending inlets b^8, and at the left hand end thereof is provided a large inlet or throat b^9, for sucking air into the same deprived of its moisture or humidity through its absorption by the tobacco and which air is also drawn through the series of inlets b^8, of said conduit b^7, thereby and conducted rearwardly into the blowing device B', and by which latter means the air is again conveyed through the transverse conduit b^3, and then longitudinally and downwardly through the perforated depending pipes or conduits b^4 and b^5, in such manner as that the presence of the air of one temperature from said perforated pipes b^5, on both sides of the interior of the housing, then in a more or less calm state or condition, will be brought into the path of water in the tank or vat C, of a different temperature, thereby receiving moisture therefrom and thus converting the air into a humid atmosphere which is presented by circulation and recirculation to the tobacco suspended from the trucks D and D', to effect first moistening of the body or surface of the tobacco and then complete ordering of the same.

It may be here remarked that the cooling or refrigerating appliance may be in the nature of a sprayer or any other somewhat similar means to be further explained to reduce the temperature of air circulating in and about the interior of the housing below the temperature of the heated water of the tank or trough C.

With reference to Figs. 5 and 6, the apparatus therein differs from that hereinbefore described in the following particulars:—Instead of providing on the interior of the housing A, a series of depending perforated tubes

b^2, connected with pipes or conduits b^4, and with a main conduit b^3, in which air is conducted therethrough by means of a blowing device B′, propeller fans B, as illustrated in Figs. 1 and 2, are employed in the top of the housing and the air is forced therefrom and thereby in different directions as indicated by the arrows in Fig. 5, and in a more or less calm state by this time, into the presence of water maintained at a different temperature from the air, so that the latter may effectually absorb the water and thus create a humid atmosphere for presenting to the tobacco supported from the trucks D and D′, in the chambers a and a', which are separated from each other by means of partitions a^9 and a^{10}. These partitions are provided with staggered openings, as clearly illustrated in Fig. 5. The cooling or refrigerating appliance for reducing the temperature of circulating air in this instance is in the nature of a water sprayer or atomizer c^3, as fully illustrated in Figs. 5 and 6. In other respects the apparatus is the same as that hereinbefore fully explained and the devices associated with the apparatus operate in the same manner as they do with reference to Figs. 1 to 4, of the drawings.

It will be manifestly obvious to those skilled in the art to which my invention appertains that still further modifications as to details of construction of the apparatus and arrangement of the devices connected therewith may be made, without departing from the spirit and scope thereof; and hence I do not wish to be understood as limiting myself to the precise arrangements of all the parts of the apparatus as illustrated; but

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The method of ordering tobacco, which consists in continuously presenting air of one temperature in a chamber to water of another temperature to produce a humid atmosphere, conveying the same into the presence of tobacco to effect dampening thereof, and causing successively the air deprived of its humidity to be revivified and again presented to the tobacco to effect ordering thereof, substantially as described.

2. The method of ordering tobacco, which consists in forcing air into the presence of water of a temperature differing from the air to become associated therewith by producing a humid atmosphere, conveying the same to tobacco which absorbs the humidity thereof, conducting the air deprived of its humidity to the water to revivify the same and then presenting the air recharged with moisture to the tobacco to effect ordering thereof, substantially as described.

3. The method of ordering tobacco, which consists in presenting under pressure air of a low temperature to water of a high temperature to create a humid atmosphere, conveying the same to tobacco, reconveying into the presence of water and presenting again to the tobacco to effect ordering thereof, substantially as described.

4. The method of ordering tobacco, which consists in presenting air artificially lowered in temperature in the path of heated water to cause association of one with the other so as to produce a humid atmosphere which is presented to tobacco, successively revivifying the air deprived of its moisture by the absorption of the same by the tobacco and recirculating the same through the tobacco, substantially as and for the purposes described.

5. The method of ordering tobacco, which consists in presenting air artificially changed as to its temperature beyond the point of agitation thereof to water maintained at a different temperature and by association of one with the other producing a humid atmosphere, continuously presenting to tobacco and successively revivifying the same deprived of its humidity through its absorption by the tobacco and again presenting thereto, substantially as and for the purposes described.

6. An apparatus for ordering tobacco, comprising a housing provided with a water tank or trough having means for heating said water, a cooling or refrigerating appliance, and a blowing or forcing device for circulating and recirculating air in the path of the water of said tank or trough, substantially as and for the purposes described.

7. An apparatus for ordering tobacco, comprising a housing provided with two communicating chambers, a blowing or forcing device for circulating and recirculating air, a water tank or trough provided with a heating device, and means for supporting tobacco in said housing, substantially as and for the purposes described.

8. An apparatus for ordering tobacco, comprising a housing provided with means adapted to contain water and maintain the same at a different temperature from that of the air therein, means for circulating and recirculating the air through said housing, and means for supporting tobacco in said housing and subjecting the same to the influence of the generated humid atmosphere therein, substantially as and for the purposes described.

9. An apparatus for ordering tobacco, comprising a housing having internal chambers, means for containing water in one of said chambers and a cooling appliance, means for circulating and recirculating the air through said housing in each instance anterior to its being presented to the water, and means for supporting tobacco in the other chamber of said housing, substantially as and for the purposes described.

10. An apparatus for ordering tobacco, comprising a housing divided into internal communicating chambers having openings in the partitions thereof, a water trough or vats with heating means therein, a forcing or blowing

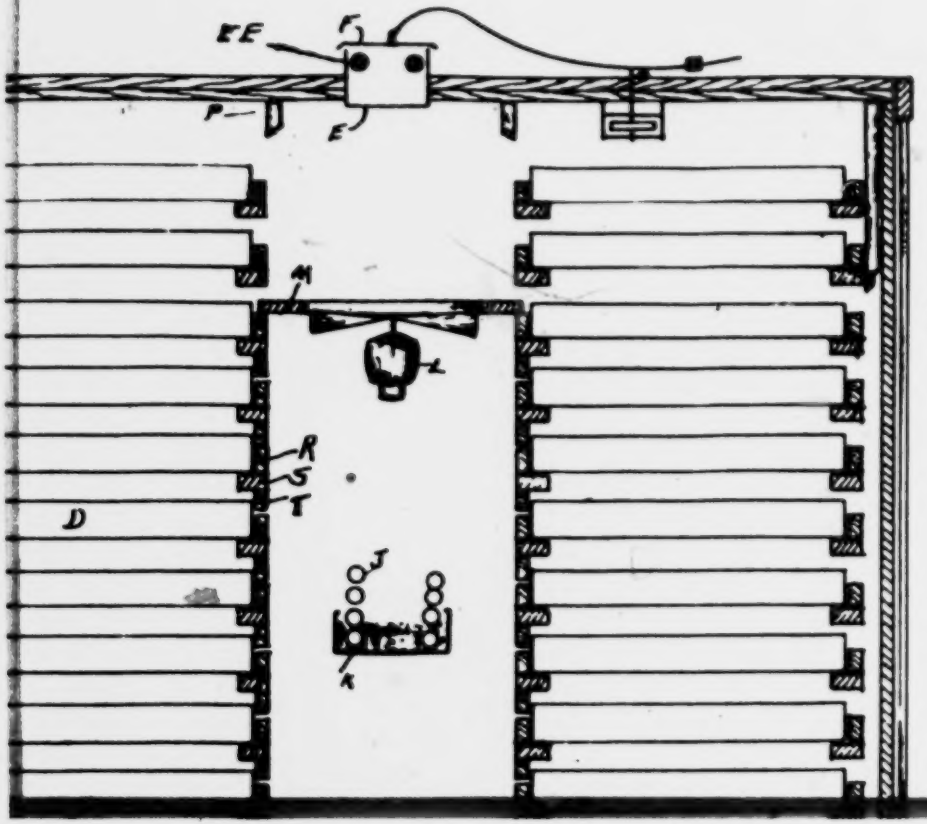
device for circulating and recirculating air within said housing, means for supporting tobacco in certain of said internal chambers, and means for cooling the air located in the other of said chambers, substantially as and for the purposes described.

In witness whereof I have hereunto set my signature in the presence of two subscribing witnesses.

CHARLES W. SCHWARTZ, JR.

Witnesses:
THOMAS M. SMITH,
RICHARD C. MAXWELL.

Incubator of E. H. SNOW, Sleepy Eye, Minn.



D - Egg trays, 24" x 36".

E - 5" exhaust with cap controled.

EE - 1" hole in side of "E" always open. There are four of these.

F - Cap covering "E" controled by thermostat.

G - ¾" fresh air intake, eleven to side.

J - Hot water heating coil.

K - Moisture pan surrounding "J".

L - 12" electric fan.

M - Fan panel

P - Upright strip that supports egg trays.

R - 1"x2" slat secured horizontally to "P".

S - 1"x2" slat secured to bottom of "R".

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means for supporting
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the air located in the
substantially as and
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Witnesses:
THOMAS M. SMITH,
RICHARD C. MAXWELL.

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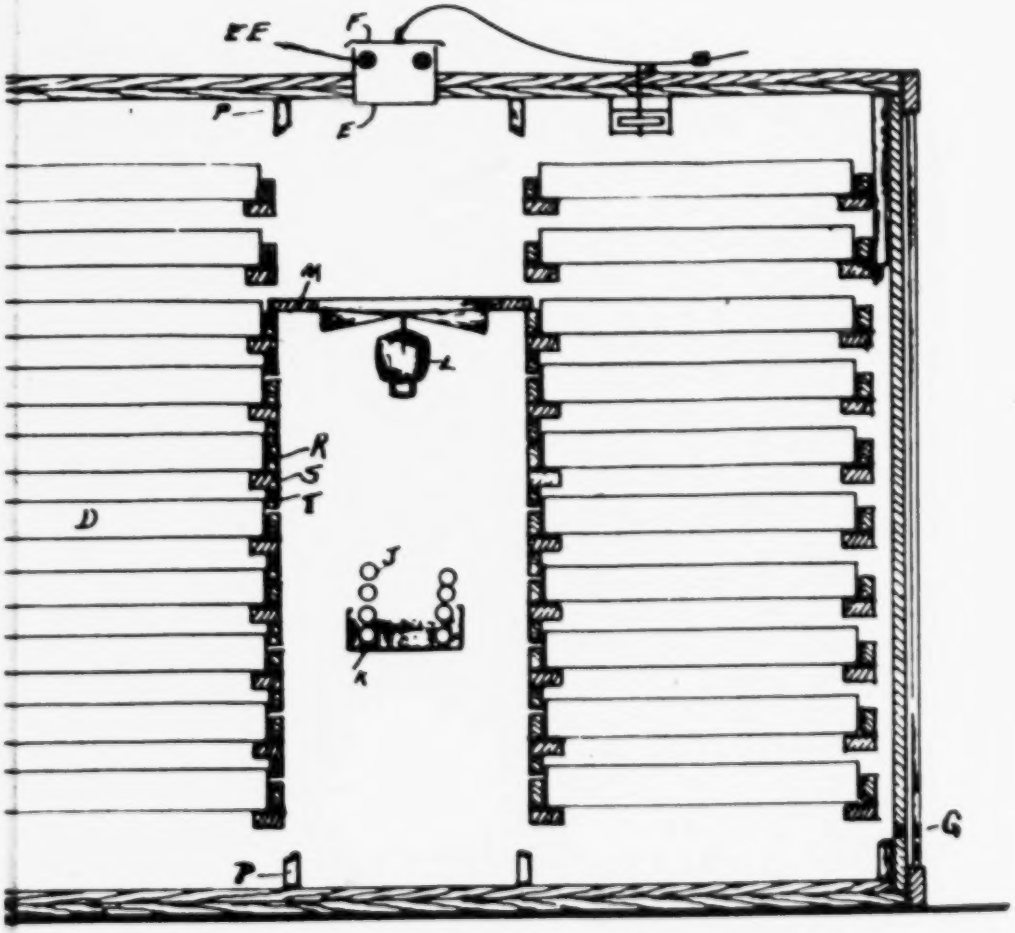

Sectional View with Front Removed.

D - Egg trays, 24" x 36".

E - 5" exhaust with cap controled.

EE - 1" hole in side of "E" always open. There are four of these.

F - Cap covering "E" controled by thermostat.

G - ¾" fresh air intake, eleven to side.

J - Hot water heating coil.

K - Moisture pan surrounding "J".

L - 12" electric fan.

M - Fan panel

P - Upright strip that supports egg trays.

R - 1"x2" slat secured horizontally to "P".

S - 1"x2" slat secured to bottom of "R".

T - 1"x2" slat secured to "P" under "S".

NOTE: Egg trays are spaced on 5" centers and trays are 3" high. This means that the space between "T" and the "R" immediately below varies from ½" to ¾" depending on the way the lumber is dressed.

Scale 1"=1'
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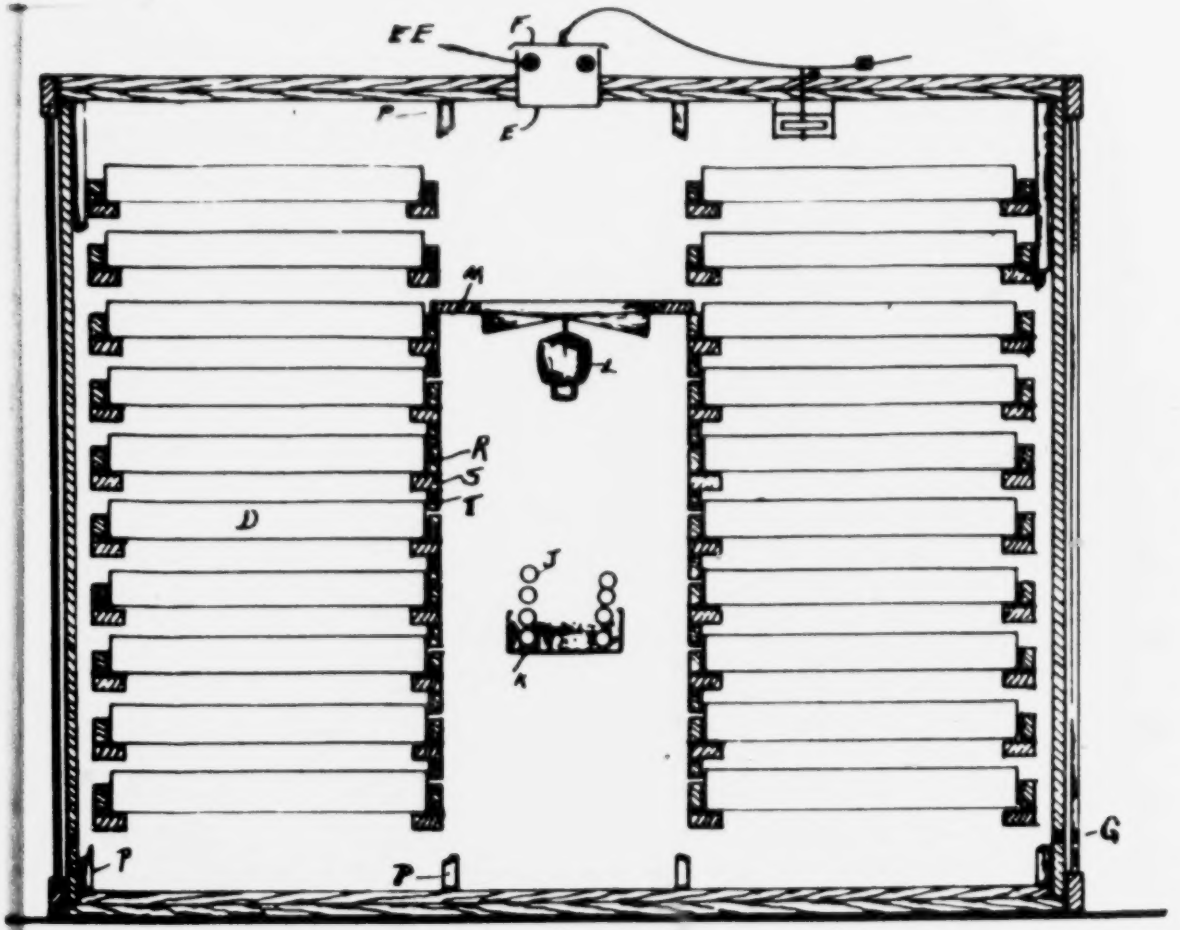
f I have hereunto set my

Witnesses:
THOMAS M. SMITH,
RICHARD C. MAXWELL.

Incubator of E. H. SNOW, Sleepy Eye, Minn.



Sectional View with Front Removed.

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NOTE: Egg trays are spaced on 5" center and trays are 3" high. This mean that the space between "T" and th "R" immediately below varies fro ½" to ¾" depending on the way the lumber is dressed.

Scale 1"=1'

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836 Nov. 24, 1925. 1,562,787

I. M. PETERSIME

INCUBATOR

Filed May 22, 1923 3 Sheets-Sheet 3

Fig. 3.

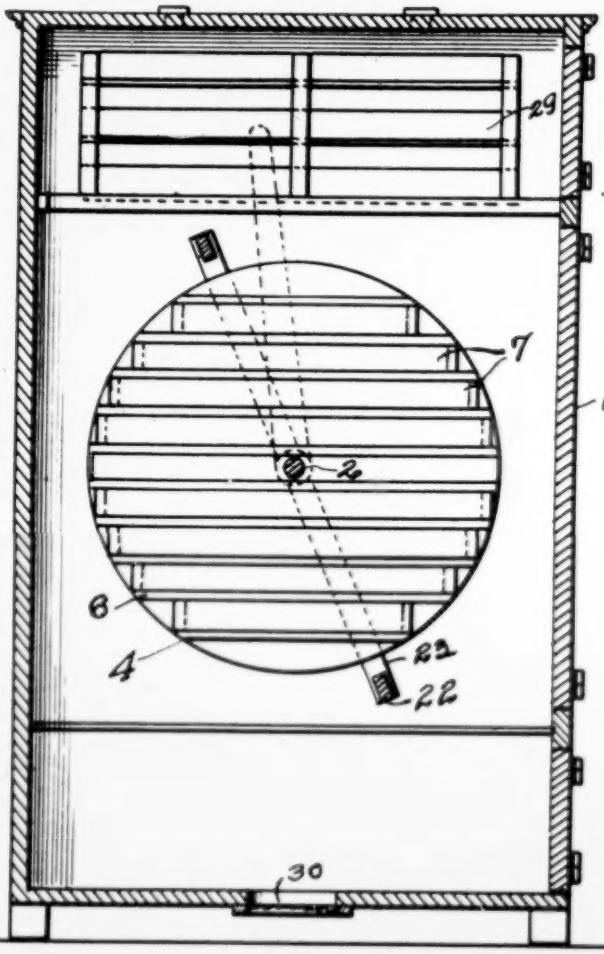

Fig. 5.

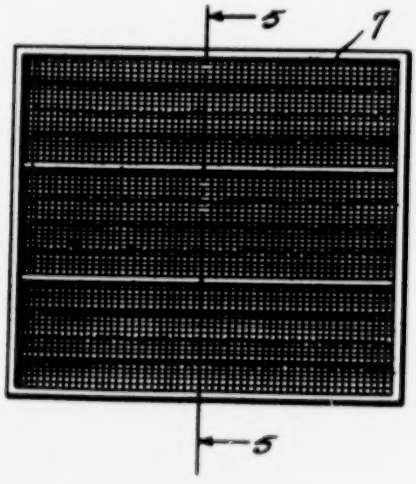

Fig. 4.

Inventor

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Filed May 22, 1923 3 Sheets-Sheet 2

Fig. 2.

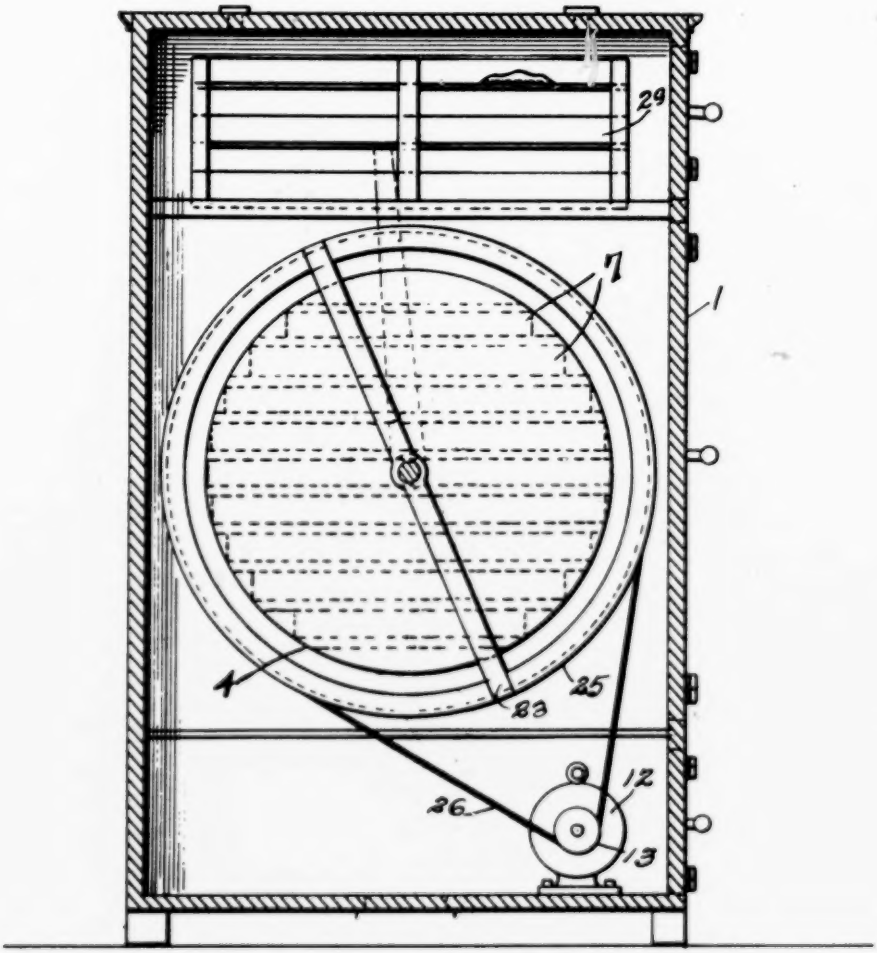
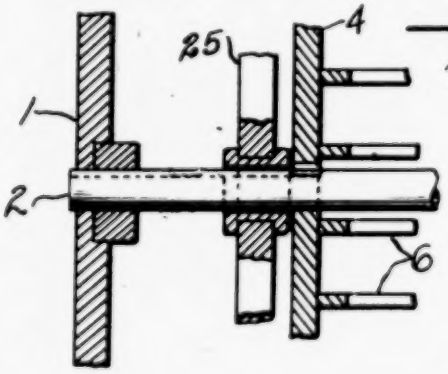


Fig. 6.



Inventor

Ira M Petersime

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I. M. PETERSIME

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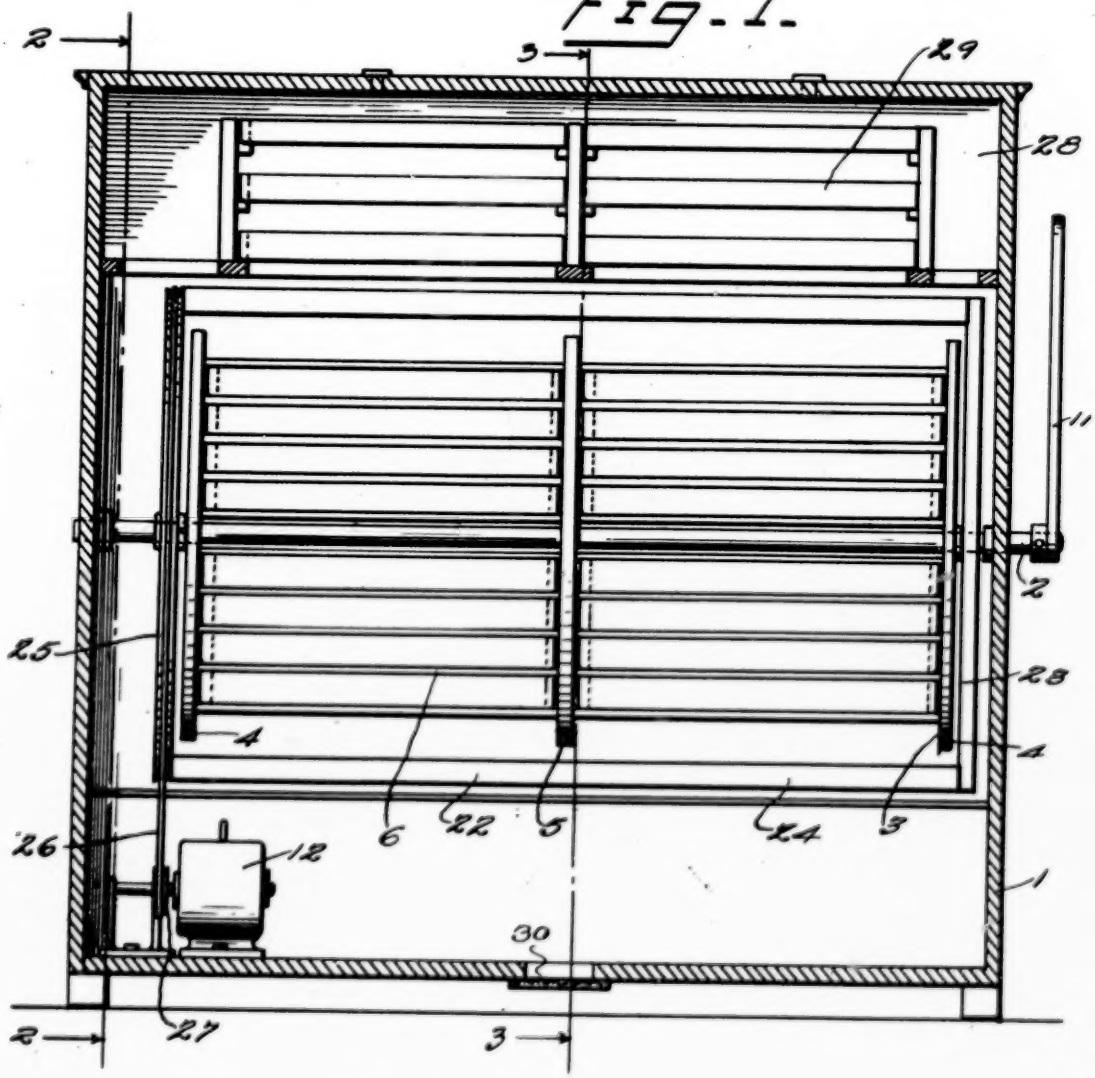
Fig. 1.



Inventor

Ira M Petersime

Patented Nov. 24, 1925.

UNITED STATES PATENT

IRA M. PETERSIME, OF GETTYSBURG, OHIO.

INCUBATOR.

Application filed May 22, 1923. Serial No. 640,736.

To all whom it may concern:

Be it known that I, IRA M. PETERSIME, a citizen of the United States, residing at Gettysburg, in the county of Darke and State of Ohio, have invented certain new and useful Improvements in an Incubator, of which the following is a specification.

This invention relates to mechanically operated incubators and more particularly to an improved device for containing incubator eggs and adapted to be operated by mechanical means whereby the eggs, during their preliminary period of incubation, will be turned and thereby subjected to an even temperature.

One of the objects of the invention is to provide a device of this character which may be heated by any suitable heating medium and which will be arranged to contain a quantity of eggs which can be slowly revolved within the cabinet, so that all of the eggs will be subjected to substantially the same conditions whereby greater efficiency will result.

A further object is the provision of a rotatable drum, and an agitator element having blades adapted to pass around the exterior of said drum to keep the air in motion and of the same temperature throughout the machine.

Other objects of the invention will appear upon consideration of the following detailed description and the accompanying drawings, in which:

Figure 1 is a vertical-longitudinal section through the device constructed in accordance with my invention.

Figure 2 is a transverse vertical section taken on the line 2—2 of Figure 1.

Figure 3 is a vertical-transverse section taken approximately on the line 3—3 of Figure 1.

Figure 4 is a plan view of one of the egg trays.

Figure 5 is a cross section taken on line 5—5 of Figure 4, and

Figure 6 is a detailed section through a portion of the mechanism.

Referring to the drawings by numerals, the cabinet 1 may be of any size or shape and is preferably provided with doors whereby access may be readily had to the interior. The cabinet is provided with a longitudinally extending shaft 2 having bearings in opposite walls of the cabinet, and this shaft is provided with a drum 3 for carrying the egg tray. The
end disc 4 and the cen
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between the partitions
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A handle or lever 11 on
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It will be understood
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an opening 30 to permit
to be inserted.

Minor changes may be
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I. M. PETERSIME

INCUBATOR

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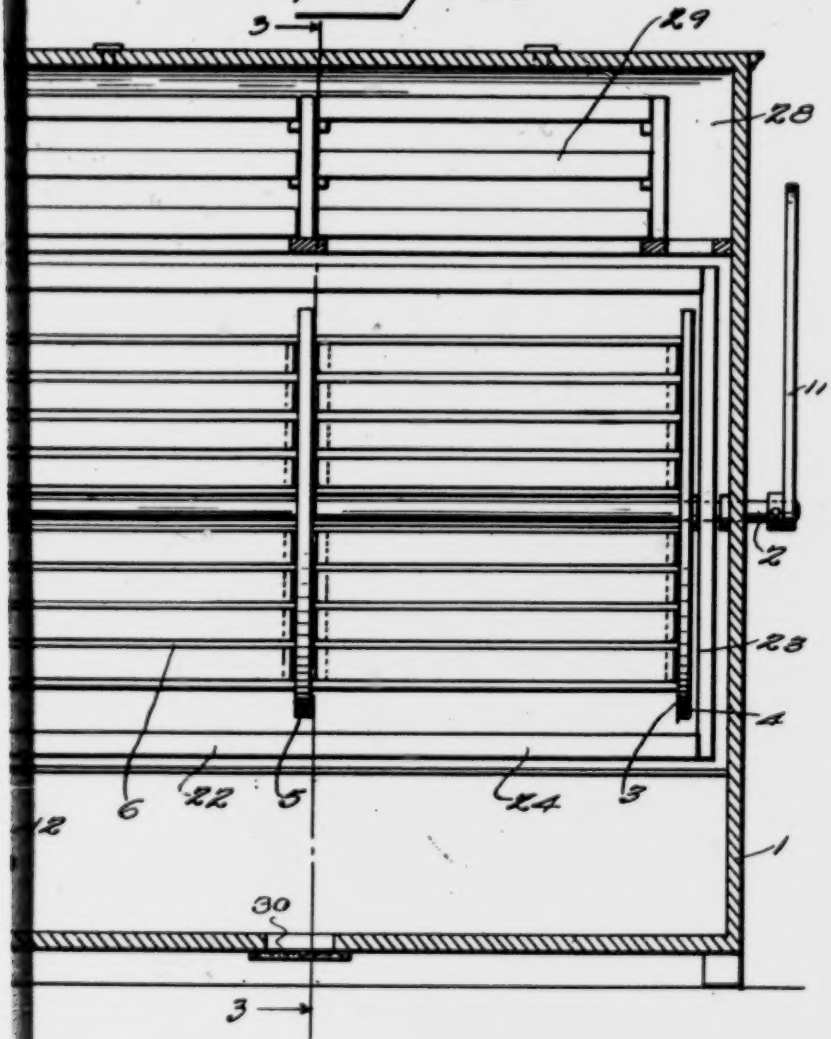
Fig. 1.



Inventor

Ira M Petersime

UNITED STATES PATENT OFFICE.

IRA M. PETERSIME, OF GETTYSBURG, OHIO.

INCUBATOR.

Application filed May 22, 1923. Serial No. 640,736.

To all whom it may concern:

Be it known that I, IRA M. PETERSIME, a citizen of the United States, residing at Gettysburg, in the county of Darke and State of Ohio, have invented certain new and useful Improvements in an Incubator, of which the following is a specification.

This invention relates to mechanically operated incubators and more particularly to an improved device for containing incubator eggs and adapted to be operated by mechanical means whereby the eggs, during their preliminary period of incubation, will be turned and thereby subjected to an even temperature.

One of the objects of the invention is to provide a device of this character which may be heated by any suitable heating medium and which will be arranged to contain a quantity of eggs which can be slowly revolved within the cabinet, so that all of the eggs will be subjected to substantially the same conditions whereby greater efficiency will result.

A further object is the provision of a rotatable drum, and an agitator element having blades adapted to pass around the exterior of said drum to keep the air in motion and of the same temperature throughout the machine.

Other objects of the invention will appear upon consideration of the following detailed description and the accompanying drawings, in which:

Figure 1 is a vertical-longitudinal section through the device constructed in accordance with my invention.

Figure 2 is a transverse vertical section taken on the line 2—2 of Figure 1.

Figure 3 is a vertical-transverse section taken approximately on the line 3—3 of Figure 1.

Figure 4 is a plan view of one of the egg trays.

Figure 5 is a cross section taken on line 5—5 of Figure 4, and

Figure 6 is a detailed section through a portion of the mechanism.

Referring to the drawings by numerals, the cabinet 1 may be of any size or shape and is preferably provided with doors whereby access may be readily had to the interior. The cabinet is provided with a longitudinally extending shaft 2 having bearings in opposite walls of the cabinet, and this shaft is provided with a drum 3 for carrying the egg tray. The drum 3 consists of the end disc 4 and the central disc 5, which are attached to the shaft 2, and these discs are connected to the ends of the dividing partitions 6 which are spaced apart to form the spaces which provide the compartments to receive the egg trays 7. The trays are held between the partitions 6 by any improved means (not shown). The egg trays are of various sizes according to their position in the drum 3, and consist of a substantially rectangular shallow tray provided with a screen bottom 8 and a top screen cover 9 and transverse screen partitions 10 between which the eggs are placed so that they will be held in their proper position and be held against displacement when the drum is rotated.

The trays are inserted into the compartment in the drum through either side of the drum and, of course, each tray will be filled with eggs before it is placed in the machine. A handle or lever 11 on the end of the shaft 2 permits the shaft to be rotated by hand.

It will be understood that a suitable source of heat supply will be provided, such as an electric heater, gas or oil lamp, and material will also be supplied to the cabinet to maintain the proper humidity, as is well known in the art. To keep the moisture agitated, however, as is well known in the art, an agitator 22 is provided which consists of the cross arms 23 on the shaft 2 at opposite ends of the drum, and these cross arms are provided with the blades 24 which rotate around the drum when the agitator is operated. One end of the agitator is provided with a relatively large pulley 25 over which is trained a cable 26 which passes over a pulley 27 on the shaft of the motor. The different sizes of the pulleys, of course, will cause the agitator to turn at the desired speed so that the moisture will be thoroughly agitated during the time the apparatus is in use. Above the drum section of the cabinet, is a top compartment 28 within which the stationary trays 29 are located, as it has been found that in the use of this device only during the first 18 days should the eggs be kept in motion. At the expiration of that time the trays should be removed and placed in the top compartment for hatching. At the bottom of the compartment 1 is shown an opening 30 to permit a heater or the like to be inserted.

Minor changes may be made in the details of construction without departing from the

spirit of the invention or the scope of the claims hereunto appended.

What I claim is:

1. An incubator comprising a cabinet, a shaft mounted in the cabinet, a drum mounted upon the said shaft for rotation thereon, a plurality of egg trays carried by the said drum and adapted to rotate therewith, an agitator element having blades adapted to pass around the exterior of the said drum, and means to actuate the said agitator element.

2. An incubator of the character described comprising a cabinet, a member arranged in said cabinet for supporting eggs in said cabinet, and an agitator element arranged in said cabinet and adapted to pass around the exterior of said egg supporting member.

3. An incubator comprising a cabinet, a shaft mounted in the cabinet, a drum mounted upon said shaft, a pair of members pivotally mounted on said shaft one at each end of said drum, a series of blades having their ends attached to said pivotally mounted members so that said members and blades will rotate together to form an agitator, and means engaging one of said pivotally mounted members to rotate the entire agitator.

4. An incubator including a heated cabinet equipped with egg holding means, and an agitator traveling around said means to maintain a uniform temperature in all parts of the cabinet.

5. An incubator including a heated cabinet equipped with egg supports, and means movable around the supports to maintain a uniform temperature around all of the supports.

6. An incubator including a heated egg containing cabinet, and an air agitator constantly traveling around the eggs in said cabinet.

In testimony whereof, I have affixed my signature.

IRA M. PETERSIME.

971

Plaintiff's Exhibits.

16)
17) Machines

Defendant's Exhibits.

F)
H) Machines

To Be Treated And Dealt With
Under Provisions of C. C. A.
Rule 34.

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972 (Stipulation of Counsel Approving Statement
Evidence.)

In the United States District Court, District of M
Fourth Division.

Samuel B. Smith, Plaintiff,
No. 2119. vs. Equity.
E. H. Snow and E. H. Snow, d. b. a. Snow's Hatche
Snow's Incubator Company, Defendant.

It Is Hereby Stipulated And Agreed That the fore
a true and correct statement of the evidence in th
entitled cause as agreed upon by the parties, and the
hereby submitted for approval by the Court under
visions of Equity Rule 75.

Dated May 23, 1933.

PAUL, PAUL & MOORE,
Counsel for Plaintiff-Appellee.

WILLIAMSON & WILLIAMSO
Counsel for Defendant-Appella

(Approval of Statement of Evidence by District Ju

The foregoing stipulation and said statement of
dence in the above entitled cause are hereby appro
24th day of May, 1933.

JOSEPH W. MOLYNEAUX

(Endorsed:) Filed May 24, 1933. Joel M. Dickey
By Thomas H. Howard, Deputy.

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ft, a pair of members piv-
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4. An incubator including a heated cabinet equipped with egg holding means, and an agitator traveling around said means to maintain a uniform temperature in all parts of the cabinet.

5. An incubator including a heated cabinet equipped with egg supports, and means movable around the supports to maintain a uniform temperature around all of the supports.

6. An incubator including a heated egg containing cabinet, and an air agitator constantly traveling around the eggs in said cabinet.

In testimony whereof, I have affixed my signature.

IRA M. PETERSIME.

971 Plaintiff's Exhibits.

16)
17) Machines

Defendant's Exhibits.

F)
H) Machines

To Be Treated And Dealt With

Under Provisions of C. C. A.

Rule 34.

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972 (Stipulation of Counsel Approving Statement of Evidence.)

In the United States District Court, District of Minnesota, Fourth Division.

Samuel B. Smith, Plaintiff,
No. 2119. vs. Equity.
E. H. Snow and E. H. Snow, d. b. a. Snow's Hatcheries and Snow's Incubator Company, Defendant.

It Is Hereby Stipulated And Agreed That the foregoing is a true and correct statement of the evidence in the above entitled cause as agreed upon by the parties, and the same is hereby submitted for approval by the Court under the provisions of Equity Rule 75.

Dated May 23, 1933.

PAUL, PAUL & MOORE,
Counsel for Plaintiff-Appellee.

WILLIAMSON & WILLIAMSON,
Counsel for Defendant-Appellant.

(Approval of Statement of Evidence by District Judge.)

The foregoing stipulation and said statement of the evidence in the above entitled cause are hereby approved this 24th day of May, 1933.

JOSEPH W. MOLYNEAUX,
Judge.

(Endorsed:) Filed May 24, 1933. Joel M. Dickey, Clerk. By Thomas H. Howard, Deputy.

1013 (Clerk's Certificate to Transcript.)

United States of America.

District Court of the United States, District of Minnesota, Fourth Division.

I, Joel M. Dickey, Clerk of said District Court, do hereby certify and return to the Honorable, the United States Circuit Court of Appeals for the Eighth Circuit, that the foregoing, consisting of 1012 pages, including certain blank pages shown at the foot hereof, numbered consecutively from 1 to 1012, inclusive, is a true and complete transcript of the record and proceedings in said cause, wherein Samuel B. Smith is plaintiff, and E. H. Snow and E. H. Snow, d. b. a. Snow's Hatcheries and Snow's Incubator Company are defendants, and of the whole thereof, (except as modified by the stipulated praecipe of said parties to be found at page 1003 of said transcript) as appears from the original records and files of said Court; and I do hereby further certify and return that I have annexed to said transcript and included within said paging the original Citation, together with proof of service thereon.

Seal
U. S. Dist. Court,
Dist. of Minnesota,
Fourth Division.

In Witness Whereof, I have hereunto set my hand, and affixed the seal of said Court at Minneapolis, in the District of Minnesota, this 27th day of May, A. D. 1933.

JOEL M. DICKEY, Clerk,
By Thomas H. Howard, Deputy Clerk.

Filed May 29, 1933, E. E. Koch, Clerk.

---

1 Stipulation as to File Wrapper Record Smith Patent in Suit, 1,262,860 of April 16, 1918.

In the United States Circuit Court of Appeals, Eighth Circuit.

E. H. Snow, et al., Appellants,
Case No. 9757. vs.
Samuel B. Smith, Appellee.

Appeal from the Fourth Division of the U. S. District Court, District of Minnesota, in Equity Case 2119.

Counsel for the parties hereby represent and stipulate as follows:

Representations:

We hereby represent that the file wrapper record of Smith patent in suit, 1,262,860 of April 16, 1918, entitled "cubator" was introduced in evidence on behalf of the defe ants, at the trial of the case in the U. S. District Court, D trict of Minnesota and was there marked "Defendants' hibit O", that in the stipulated praecipe of transcript it provided that the said file wrapper record, to-wit: Defe ants' Exhibit O, might be regarded as a physical exhibit a be transmitted with the other physical exhibits to the Circ Court of Appeals; and we hereby further represent that said Exhibit O contained two distinct portions, the first which, composed of pages 1 to 59 thereof, a copy of the pat and two pages entitled "Contents", relates to the history the application in the Patent Office, and the second portion which, composed of pages 60 to 143 inclusive, gives the id tifications of the various suits brought for the alleged fringement of said patent and shed no light whatever on history of the Smith application which matured into above identified patent in suit; and we hereby further rep sent that Appellant's counsel has been advised by the Cl of the Circuit Court of Appeals, that, in his opini
2 it is desirable, under Section 3 of Rule 14 of the s Court of Appeals, to have the application record said Smith patent in suit printed for use in the Court of A peals.

Stipulation:

In view of the foregoing facts, it is hereby stipulated t the first portion of the said Defendant's Exhibit O, to-w pages 1 to 59 inclusive, a copy of the patent and the t pages of said Exhibit O, entitled "Contents", may be ce fied to by the Clerk of the Trial Court and be sent up by h to the Court of Appeals and be printed as part of the tra script on appeal, subject to verification by reference to original exhibit, which will be sent up as a physical exhi

WILLIAMSON & WILLIAMSON,
Counsel for Appellants.

Dated: June 5th, 1933.

A. C. Ely,
Counsel for Appellee.

Dated: June 7, 1933.

1013 (Clerk's Certificate to Transcript.)

United States of America.

District Court of the United States, District of Minnesota, Fourth Division.

I, Joel M. Dickey, Clerk of said District Court, do hereby certify and return to the Honorable, the United States Circuit Court of Appeals for the Eighth Circuit, that the foregoing, consisting of 1012 pages, including certain blank pages shown at the foot hereof, numbered consecutively from 1 to 1012, inclusive, is a true and complete transcript of the record and proceedings in said cause, wherein Samuel B. Smith is plaintiff, and E. H. Snow and E. H. Snow, d. b. a. Snow's Hatcheries and Snow's Incubator Company are defendants, and of the whole thereof, (except as modified by the stipulated praecipe of said parties to be found at page 1003 of said transcript) as appears from the original records and files of said Court; and I do hereby further certify and return that I have annexed to said transcript and included within said paging the original Citation, together with proof of service thereon.

Seal U. S. Dist. Court, Dist. of Minnesota, Fourth Division.

In Witness Whereof, I have hereunto set my hand, and affixed the seal of said Court at Minneapolis, in the District of Minnesota, this 27th day of May, A. D. 1933.

JOEL M. DICKEY, Clerk,
By Thomas H. Howard, Deputy Clerk.

Filed May 29, 1933, E. E. Koch, Clerk.

---

1 Stipulation as to File Wrapper Record Smith Patent in Suit, 1,262,860 of April 16, 1918.

In the United States Circuit Court of Appeals, Eighth Circuit.

E. H. Snow, et al., Appellants,
Case No. 9757. vs.
Samuel B. Smith, Appellee.

Appeal from the Fourth Division of the U. S. District Court, District of Minnesota, in Equity Case 2119.

Counsel for the parties hereby represent and stipulate as follows:

Representations:

We hereby represent that the file wrapper record of the Smith patent in suit, 1,262,860 of April 16, 1918, entitled "Incubator" was introduced in evidence on behalf of the defendants, at the trial of the case in the U. S. District Court, District of Minnesota and was there marked "Defendants' Exhibit O", that in the stipulated praecipe of transcript it was provided that the said file wrapper record, to-wit: Defendants' Exhibit O, might be regarded as a physical exhibit and be transmitted with the other physical exhibits to the Circuit Court of Appeals; and we hereby further represent that the said Exhibit O contained two distinct portions, the first of which, composed of pages 1 to 59 thereof, a copy of the patent and two pages entitled "Contents", relates to the history of the application in the Patent Office, and the second portion of which, composed of pages 60 to 143 inclusive, gives the identifications of the various suits brought for the alleged infringement of said patent and shed no light whatever on the history of the Smith application which matured into the above identified patent in suit; and we hereby further represent that Appellant's counsel has been advised by the Clerk of the Circuit Court of Appeals, that, in his opinion, it is desirable, under Section 3 of Rule 14 of the said Court of Appeals, to have the application record of said Smith patent in suit printed for use in the Court of Appeals.

2

Stipulation:

In view of the foregoing facts, it is hereby stipulated that the first portion of the said Defendant's Exhibit O, to-wit: pages 1 to 59 inclusive, a copy of the patent and the two pages of said Exhibit O, entitled "Contents", may be certified to by the Clerk of the Trial Court and be sent up by him to the Court of Appeals and be printed as part of the transcript on appeal, subject to verification by reference to the original exhibit, which will be sent up as a physical exhibit.

WILLIAMSON & WILLIAMSON,
Counsel for Appellants.

Dated: June 5th, 1933.

A. C. Ely,
Counsel for Appellee.

Dated: June 7, 1933.

Order.

The foregoing stipulation is hereby approved and it is hereby ordered that the same be carried into effect.

JOSEPH W. MOLYNEAUX,
District Judge.

Dated: June 9th, 1933.

(Endorsed): Filed June 9, 1933. Joel M. Dickey, Clerk. By Thomas H. Howard, Deputy.

Filed Jun. 17, 1933. E. E. Koch, Clerk.

NUMBER (Series of 1915), 127915

1916

(EX'R'S BOOK) E

DIV. 38

PATENT No. 1262

Name Samuel B. Smith,
Assg to The Buckeye Incubator
of Springfield, Ohio, a corp. of O

of Cleveland,

County of

State of Ohio

Invention Incubators,

PARTS OF APPLICATION FILED.

	ORIGINAL	RENEWED
Petition	Oct. 26, 1916	
Affidavit	" " , 1916	
Specification	" " , 1916	
Drawing 2 Shts	" " , 1916	
Photo Copy	, 191	
First Fee Cash $15	Oct 26, 1916	
" " Cert.	, 191	
Appl. filed complete	Oct 26, 1916	

, filed , 191

Examined and Passed to Issue May 8 1917

Order.

oregoing stipulation is hereby approved and it is ordered that the same be carried into effect.

JOSEPH W. MOLYNEAUX,
District Judge.

June 9th, 1933.

rsed): Filed June 9, 1933. Joel M. Dickey, Clerk.
as H. Howard, Deputy.

Jun. 17, 1933. E. E. Koch, Clerk.

3 (Defendants' Exhibit O, File Wrapper and Contents.)

NUMBER (Series of 1915), 127915

1916

(EX'R'S BOOK) E 126/6

DIV. 38

PATENT No. 1262860

Name Samuel B. Smith
Assg to The Buckeye Incubator Co.,
of Springfield, Ohio, a corp. of Ohio

of Cleveland,

County of

State of Ohio.

Invention Incubators.

PARTS OF APPLICATION FILED.	ORIGINAL	RENEWED
Petition	Oct. 26, 1916	, 191
Affidavit	" " , 1916	, 191
Specification	" " , 1916	, 191
Drawing 2 Shts	" " , 1916	, 191
Photo Copy	, 191	, 191
First Fee Cash $15.	Oct 26, 1916	, 191
" " Cert.	, 191	, 191
Appl. filed complete	Oct 26, 1916	, 191
Examined and Passed for Issue	Mar 8, 1918	, 191
J. A. Ede	Exr. Div. 38	Exr. Div.
Notice of Allowance	Mch. 12, 1918	, 191
Final Fee Cash $20	May 18, 1918	, 191
" Cert.	, 191	, 191
Patented	APR 16 1918	, 191

filed , 191

Division of App., No.

JOSEPH W. MOLYNEAUX,
District Judge.

une 9th, 1933.

ed): Filed June 9, 1933. Joel M. Dickey, Clerk.
s H. Howard, Deputy.

n. 17, 1933. E. E. Koch, Clerk.

Name Asst to The Buckeye Incubator Co.,
of Springfield, Ohio, a corp of Ohio

of Cleveland,

County of

State of Ohio.

Invention Incubators.

Division of App., No. , Filed , 191

PARTS OF APPLICATION FILED.

	ORIGINAL	RENEWED
Petition	Oct. 26, 1916	, 191
Affidavit	" " , 1916	, 191
Specification	1 Sht " " , 1916	, 191
Drawing	2 Shts " " , 1916	, 191
Photo Copy	, 191	, 191
First Fee Cash	$15 Oct 26, 1916	, 191
" " Cert.	, 191	, 191
Appl. filed complete	Oct 26, 1916	, 191
Examined and Passed for Issue	Mar 8, 1918	, 191
J. R. Ide Exr. Div.	38	Exr. Div.
Notice of Allowance	Mch. 12, 1918 By Commissioner.	, 191 By Commissioner.
Final Fee Cash	$20 Mar 18, 1918	, 191
" Cert.	, 191	, 191
Patented	APR 16 1918	, 191

Attorney Staley & Bowman, Gotwald Bldg
Springfield, Ohio

Associate Attorney Percy Norton Springfield Ohio

(No. of Claims Allowed 5) Title as Allowed Incubators

(Div Claims 1 and 5

Ch. 11 9 — 27

OCT 26 1916

October 24th, 1916.

Commissioner of Patents,

Sir:-

We send you herewith an application of Samuel B. Smith for patent for improvements in Incubators. Enclosed is our check for $15.00 to cover the first fee thereon.

Respectfully,

STALEY & BOWMAN

CIW/B

PETITION

TO THE COMMISSIONER OF PATENTS:

YOUR PETITIONER , Samuel B. Smith, a citizen of the United States, residing at Cleveland, in the County of Cuyahoga and State of Ohio whose Post Office address is Cleveland, Cuyahoga County, Ohio prays that Letters Patent may be granted to him for the IMPROVEMENT IN INCUBATORS set forth in the annexed specification; and he hereby appoints STALEY & BOWMAN [No. 5056,] a firm composed of Paul A. Staley and Border Bowman, of Springfield, Ohio, his Attorneys, with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to receive the Patent and to transact all business in the Patent Office connected therewith.

Samuel B Smith

(Inventor signs here first name in full)

SPECIFICATION

TO THE COMMISSIONER OF PATENTS:

YOUR PETITIONER , Samuel B. Smith, a citizen of the United States, residing at Cleveland, in the County of Cuyahoga and State of Ohio whose Post Office address is Cleveland, Cuyahoga County, Ohio prays that Letters Patent may be granted to him for the IMPROVEMENT IN INCUBATORS set forth in the annexed specification; and he hereby appoints STALEY & BOWMAN [No. 5055,] a firm composed of Paul A. Staley and Border Bowman, of Springfield, Ohio, his Attorneys, with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to receive the Patent and to transact all business in the Patent Office connected therewith.

Samuel B. Smith

(Inventor sign here first name in full)

SPECIFICATION

TO ALL WHOM IT MAY CONCERN:

Be It Known, That I, Samuel B. Smith, a citizen of the United States, residing at Cleveland, in the County of Cuyahoga and State of Ohio have invented certain new and useful improvements in INCUBATORS of which the following is a specification:

The improved apparatus and method, is particularly designed for extensive operations wherein a chamber of large dimensions is adapted to contain thousands of eggs in separate trays arranged in tiers and the method of heating is such that the heated air is adapted to the eggs in various stages of incubation. There is a forced circulation of hot air through the chamber which is adapted preferably to maintain all eggs at temperatures between 99° and 106° Fahrenheit approximately and this improved system contemplates that fresh eggs will be placed in a horizontal plane, preferably by means of trays supported in horizontal planes, and after the eggs have been subject to the circulation of hot air for a predetermined time (the air circulating largely around the eggs) they will be placed in a tilted or inclined position in a different location but still subject to the same column of air and at this period of incubation they will be tilted in different planes at regular intervals during the time they remain in this latter position, and after they have remained for a predetermined time they will be again moved to a different position with reference to the forced circulation of hot air and so placed therein that the air will tend to keep the eggs below 105° temperature, and in this last named position the air will be forced to pass between the different eggs and will in effect act as a cooling medium for the eggs.

In the accompanying drawings:

Fig. 1 is a cross section of my improved incubator.

Fig. 2 is a perspective view of one of the egg trays with one end removed to more clearly disclose the open mesh bottom.

Fig. 3 is a vertical section of the incubator on line 3 -3, Fig. 1.

Fig. 4 is a perspective view of a portion of one of the tilting racks for the trays.

The invention comprises a walled chamber 2 corresponding in size to that of an ordinary room, say approximately nine feet

high, eight to ten feet wide, and of any desired length, and this chamber is subdivided longitudinally by two parallel rows of curtains 3 and 4 to provide a central compartment or corridor 5 and side compartments 6 and 7. Entrance to the corridor is gained by a door 8, and the compartments behind the curtains contain elevated stationary racks 9 which are within convenient reach of the attendant for introducing the fresh supply and from which elevated position the trays may be shifted at the proper time to a tier of tilting racks 10 on a lower plane and suspended therefrom by links 11. A series of stationary racks 12 are also arranged beneath the tilting racks 10, and all of said racks are of open construction and of the same size to permit interchange of the shallow trays 13 for the eggs to be hatched. These trays are provided with open mesh bottoms 14 upon which the smaller ends of the eggs rest in close and solid formation, and each tray of eggs occupies the upper rack 9 for the first three days, and is then transferred to a place in the upper end of the tilting rack 10. During the next fifteen days the trays in the tilting rack are shifted from higher to lower planes therein and tilted at frequent intervals to stand in oppositely-inclined positions. The tilting of the eggs is preferably arranged to put the eggs substantially on their sides. When the eggs in the lower-most trays in the tilting racks 10 are about ready to hatch each tray is transferred to the stationary rack 12 where the chicks may be removed as occasion requires.

Each tilting rack 10 comprises perpendicular corner bars 15 pivotally united by a series of cross bars 16 carrying connecting angle irons 17 extending from front to rear at each side and upon which the trays are adapted to be slidably supported. The links 11 are pivotally connected at the center of the uppermost cross bars 16 of each tilting rack, thus permitting an entire series of trays to be placed in an inclined position by merely raising or lowering one side of the rack by hand engagement. The weight and friction and balance of the parts cause the

trays to remain in any shifted position, whether horizontal or inclined. The fans or series of fans 18 mounted upon the hinged trap doors 19 forming the ceiling of the central corridor 5 constitute the means for forcing the hot air through the chamber and there are circular openings 20 provided in said doors within which the fans are arranged properly. The longitudinal space 21 above the fans has open communication above the side walls 22 with the upper ends of the rack compartments behind the curtains 3 and 4 and these curtains extend a sufficient distance, as indicated in Fig. 1, to cause the heated air distributed by the fans to pass downwardly through the central corridor to a point near the bottom of the chamber where it can pass into the space occupied by the trays. As explained later the trays near the bottom are preferably arranged so that the air is forced to pass between the eggs in each tray thereby cooling or holding the temperature of those eggs down. Thence the air passes into spaces above the lower series of trays until it reaches the distributing space 21 above the fan. Coils of heating pipe 23 are arranged in the space 21 to heat the air and more or less fresh air may be taken in through the valved opening 24 above the space 21 and this fresh supply of air may be charged with steam to a greater or less degree by means of a valve controlled jet or pipe 26 see Fig. 3. By lowering the hinged trap doors, the motor and fan are also easily reached for inspection, etc.

In Fig. 3 only a single curtain 3 is shown in place, the curtain or curtains at the right being entirely removed to disclose the racks and trays in full lines, and it will be also noted that the vertical spaces 27 between the adjacent tilting racks 10 are closed at their lower ends by flexible strips of fabric which are attached to and extend upward at each side of each rack so as to compel the air to circulate through the mesh bottom and around and about each egg as heretofore referred to, and as the eggs further advanced in incubation are contained in

these lower trays and as the danger is that the temperature will rise in these eggs to a point injurious to incubation the improved method disclosed herein permits the circulating air to act as a medium to prevent the over heating at this stage of incubation and this is accomplished by promoting an induced draft within the lower trays. It is obvious that the fans can be so arranged and can be operated at such speed as to cause the hot air to circulate fast enough to keep the temperature throughout the chamber between the limits of ~~98°~~ 100° and ~~106°~~ 105°.

It, therefore, appears that the improved apparatus and method contemplates the application of hot air circulating in a column with such speed as to keep the temperature substantially uniform and so arranging the eggs that the fresh eggs are placed at one point in the column of air and held in a horizontal plane until they reach a predetermined stage of incubation and then put at a different point in the same column of air and kept in planes inclined to the horizontal and thereafter placed at such a point in the column of air that the forced draft of air acts to hold the eggs at a uniform temperature and to prevent them from becoming overheated and thereafter placing the eggs into final position for the hatching operation.

Any suitable thermostatic means may be employed for regulating the temperature, such for instance as a thermostat commonly employed in incubators of a well-known construction and illustrated in letters-patent No. 1,111,138, dated September 22nd, 1914, which thermostat may be suitably connected to the valve controlling the steam or hot water, as the case may be, which passes through the pipes 23.

Having thus described my invention, I claim:-

1. The method of hatching eggs by arranging the eggs in a column and applying heated air impelled about the eggs, the heated air being adapted to the eggs in various stages of incubation.

2. The method of hatching eggs consisting of arranging the eggs in a column and forcing heated air through and about the eggs, the air being impelled from the bottom upwardly and having the eggs in the earliest stages of incubation at the upper part of the column arranged in substantially horizontal planes and the eggs in later stages of incubation arranged in planes inclined to the horizontal and at a different place in the same column of air, for the purpose specified.

3. The method of hatching eggs consisting of arranging the eggs in columns and applying heated air forced through and about the column of eggs, the air being impelled upwardly throughout the column of eggs, the eggs in different stages of incubation being placed in different parts of the column of heated air and the eggs in more advanced stages of incubation being arranged in tilted position for the purpose specified.

4. The method of hatching eggs, consisting of arranging the eggs in columns and applying heated air to said column of eggs, the air being forced through same from the bottom of said column upwardly toward the top thereof, and having the eggs in the earliest stages of incubation in one place in the column so arranged that the air can circulate around them and the eggs in the more advanced stages of incubation arranged at a different plane in the column of air whereby the air will be forced through and between the different eggs, for the purpose specified.

Re B
Re a
Subst B'
Sub.

1. The method of hatching eggs [illegible] eggs in various stages of incubation in a column and applying heated air impelled about the eggs, the heated air being adapted to the eggs in various stages of incubation.

C.

Re a
" B
" "

2. The method of hatching eggs consisting of arranging the eggs in a column and forcing heated air through and about the eggs, the air being impelled from the bottom upwardly and having the eggs in the earliest stages of incubation at the upper part of ~~at one place in~~ the column arranged in substantially horizontal planes and the eggs in later stages of incubation arranged in planes inclined to the horizontal and at a different place in the same column of air, for the purpose specified.

Re a
" B

3. The method of hatching eggs consisting of arranging the eggs in columns and applying heated air forced through and about the column of eggs, the air being impelled upwardly throughout the column of eggs, the eggs in different stages of incubation being placed in different parts of the column of heated air and the eggs in more advanced stages of incubation being arranged in tilted position for the purpose specified.

Re B

4. The method of hatching eggs, consisting of arranging the eggs in columns and applying heated air to said column of eggs, the air being forced from the bottom of said column upwardly toward the top thereof through same, and having the eggs in the earliest stages of incubation in one place in the column so arranged that the air can circulate around them and the eggs in the more advanced stages of incubation arranged at a different plane in the column of air whereby the air will be forced through and between the different eggs, for the purpose specified.

5. In an incubator, a chamber having racks and trays for the eggs, and a power-driven fan to produce a flow

of heated air through said racks and trays.

6. In an incubator, a chamber having trays for the eggs arranged in tiers, and means to promote a draft of air through the trays containing the eggs in the last stages of incubation.

7. In an incubator, a chamber and trays for the eggs arranged in tiers therein, means to heat said eggs to incubation temperature, and means to circulate the air through each tier of trays.

8. In an incubator, a chamber, means to heat air and means to circulate the heated air within said chamber, a tilting rack within said chamber, and trays for the eggs carried by said rack.

9. In an incubator, a chamber having means to heat the air and means to circulate the heated air therein, and a hinge-jointed rack suspended in said chamber adapted to support a tier of egg-trays in differently-inclined positions.

10. In an incubator, a rack comprising parallel upright members having hinged cross pieces adapted to support separate trays at different elevations, and suspensory means in equalizing pivotal connection with said rack adapting all the trays carried by said racks to be tilted to corresponding inclined positions.

11. In an incubator, a chamber and a rack and trays therein, a fan and means to operate the same to circulate air upwardly through said rack and trays, means to heat the eggs uniformly within said chamber, and means to regulate admission of fresh air into and foul air out of said chamber.

12. In an incubator, a chamber having a rack and egg trays removably mounted upon said rack, a power driven fan to circulate air through said chamber, means to heat the air within said chamber, and means to supply vapor for intermixture and circulation with said air.

13. In an incubator, a chamber having a series racks therein and egg trays mounted in said racks, and means to circulate heated air into and through each rack and its trays.

14. In an incubator, a chamber having a series of tilting racks therein and egg trays mounted in tiers in each rack, means to enclose the space between the racks and tiers at the bottom of said racks, and means to circulate air through said bottom trays.

15. In an incubator, a chamber having a compartment provided with an air-circulating fan and a second compartment at one side of the first compartment having tiers of removable open egg trays and upper and lower communicating passages to permit circulation of air in the same direction continuously through said trays.

16. In an incubator, a chamber having a curtain subdividing it into two compartments, one of said compartments having tiers of egg-trays therein, a power driven fan in air-circulating communication with both compartments, and means to heat the air circulated by said fan.

~~17.~~ 8. In an incubator, a closed chamber having a curtained corridor and compartments at each side thereof and an upper air-distributing space, an air-circulating fan and means to heat the air in said upper space, and racks having removable

935V-55

egg-trays superimposed in said side compartments.

14 ~~18.~~ In an incubator, a ~~closed~~ closed chamber having a compartment provided with a power driven fan hinged to swing downwardly from the ceiling thereof, and tiers of egg-trays having therein eggs in various stages of incubation in said chamber having open communication with said compartment adapted to ~~circulate~~ to circulate the air through ~~said~~ the trays.

19. In an incubator, a compartmented chamber having separate tiers of open-bottomed egg-trays in one or more of the chamber compartments, means to produce a forced circulation of heated air within said compartmented chamber, and means to produce conflux of air-currents through one end of each tier of trays.

20. In an incubator, a compartmented chamber having an air-distributing space provided with a fresh-air intake, separate tiers of open-bottomed egg-trays in one or more of the compartments, a power driven fan to circulate heated air within said compartmented chamber, and means to produce conflux of air-current through the bottom of each tier of egg-trays.

21. In an incubator, a compartmented chamber having separate tilting racks provided with egg-trays having air passages in their bottoms, flexible enclosing means for said racks, and means to produce a forced circulation of heated air through said enclosed racks and egg-trays therein.

22. In an incubator, a compartmented chamber and a power-driven fan to circulate heated air therethrough, stationary egg-tray racks in the upper and lower [illegible]

18. In an incubator, a closed chamber having a compartment provided with a power driven fan hinged to swing downwardly from the ceiling thereof, and tiers of egg-trays in said chamber having open communication with said compartment adapted to circulate the air through said trays.

19. In an incubator, a compartmented chamber having separate tiers of open-bottomed egg-trays in one or more of the chamber compartments, means to produce a forced circulation of heated air within said compartmented chamber, and means to produce conflux of air-currents through one end of each tier of trays.

20. In an incubator, a compartmented chamber having an air-distributing space provided with a fresh-air intake, separate tiers of open-bottomed egg-trays in one or more of the compartments, a power driven fan to circulate heated air within said compartmented chamber, and means to produce conflux of air-current through the bottom of each tier of egg-trays.

21. In an incubator, a compartmented chamber having separate tilting racks provided with egg-trays having air passages in their bottoms, flexible enclosing means for said racks, and means to produce a forced circulation of heated air through said enclosed racks and egg-trays therein.

22. In an incubator, a compartmented chamber and a power-driven fan to circulate heated air therethrough, stationary egg-tray racks in the upper and lower portions of one chamber compartment and separate tilting egg-tray racks intermediate said upper and lower stationary racks.

23. In an incubator, a compartmented chamber having separate tilting racks provided with egg-trays having air passages in their bottoms, flexible enclosing means for said racks, and means to produce a forced circulation of heated air through said enclosed racks and the egg-trays therein.

~~15.~~ ~~24.~~ In an incubator, a closed chamber having a central corridor provided with an air-distributing space in its upper portion and a power-driven fan in said space, curtains at each side of said corridor, separate stationary and tilting racks behind said curtains, egg-trays having open-mesh bottoms removably mounted upon said racks, and means to heat the air circulated through said chamber.

25. The method of hatching eggs by arranging the eggs in a column one above the other and forcing heated air through said column.

26. In an incubator changeable supporting means whereby eggs arranged in tiers one above the other may be changed in position sufficient to incubate.

27. In an incubator changeable supporting means whereby eggs arranged in tiers one above the other may be changed in position sufficient to incubate in a current of heated air forced through said tier and thermostatic means for controlling the temperature of said air.

28. In an incubator changeable supporting means whereby eggs arranged in tiers one above the other may be changed in position sufficient to incubate and thermostatic means for controlling the temperature of said eggs.

In Testimony Whereof, I have hereunto set my hand this 20th day of October 1916.

WITNESSES:

Hannah Plain. } Samuel B Smith
(Two witnesses sign here) Ida M. Smith } (Inventor sign here first name in full)

OATH

State of Ohio }
County of Clark } ss:

Samuel B. Smith

the above named petitioner, being duly sworn deposes and says that he is a citizen of the United States of America and resident of Cleveland, Cuyahoga County, Ohio; that he verily believes himself to be the original, first, and sole inventor of the improvement in

INCUBATORS

described and claimed in the annexed specification; that he does not know and does not believe that the same was ever known or used before his invention or discovery thereof, or patented or described in any printed publication in any country before his invention or discovery thereof, or more than two years prior to this application, or in public use or on sale in the United States for more than two years prior to this application; and that no application for patent on said improvement has been filed by him or his representatives or assigns in any country foreign to the United States.

Samuel B Smith

(Inventor sign here first name in full)

day of October 1916.

WITNESSES:

Hannah Plair. | Samuel B Smith

(Two witnesses sign here) Ida M. Smith | (Inventor sign here first name in full)

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INCUBATORS

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Samuel B Smith

(Inventor sign here first name in full)

Sworn to and subscribed before me this 20th day of October 1916.

Guy E. M. Floyd

NOTARY PUBLIC.

873

Div. 38 Room 378 CDH 2-260 LDH

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name.

Paper No. 2

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON Nov. 1, 1916.

Staley & Bowman,

Gotwald Bldg.,

Springfield, O.

Please find below a communication from the ***EXAMINER*** *in charge of the application of*

Samuel B. Smith, Ser. No. 127,915, filed Oct. 26, 1916: Incubators.

Thomas Ewing
Commissioner of Patents.

6—2631

Claims 1, 25 and 26 are rejected on each of

428

Morgan, 272,744, Feb. 20, 1883,
Class 119/40,
Winkler, 286,756, Oct. 16, 1883,
Class 119/35,
Bassini et al., 330,457, Nov. 17, 1885,
Class 119/42,
Campbell, 344,474, June 29, 1886,
X-ref. in same class,
Boyd, 828,181, Aug. 7, 1906
Class 119/35,
VanKeuren, 1,160,793, Nov. 16, 1915,
Class 119/40, and the

German patents to

Mann, 117,089, Feb. 4, 1901,
Class 119/42, 1 sheet, and
Stulik, 155,917, Nov. 11, 1904,
Class 119/35, 1 sheet.

The references show the "column". The air is "forced" by the arrangement of the heating means which causes the heated air to rise and thus produces a circulation of air. The last two lines of Claim 1 are vague.

Claims 2, 3 and 4 are [illegible]

Staley & Bowman,

Gotwald Bldg.,

Springfield, O.

Please find below a communication from the ***EXAMINER*** *in charge of the application of*

Samuel B. Smith, Ser. No. 127,915, filed Oct. 26, 1916: Incubators.

Thomas Ewing
Commissioner of Patents.

c 6—2931

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The references show the "column". The air is "forced" by the arrangement of the heating means which causes the heated air to rise and thus produces a circulation of air. The last two lines of Claim 1 are vague.

Claims 2, 3 and 4 are rejected on Stulik suggesting arranging the eggs in different places in the column at different periods of incubation in view of

Perkins, 745,458, Dec. 1, 1903,
Class 119/37, suggesting inclining some of the egg trays.

127915
13

Claims 5. 8 and 13 are rejected on Stulik in view of each of

Conant, 297,676, April 29, 1884,
X-ref. in Class 119/44, and
Christianson, 559,676, May 5, 1896,
X-ref. in same class, suggesting the racks, and of

Goldstein, 1,137,752, May 4, 1915,
X-ref. in Class 119/35 (see 12), suggesting the fan which otherwise does not involve invention as it is common to use such a fan to produce a circulation of air wherever desired.

Claims 6 and 7 are rejected on Stulik in view of Goldstein.

Claim 9 is rejected on Stulik in view of Goldstein and Christianson.

In Claim 10, line 4, what does "equalizing" mean? Claim 10 is otherwise allowed.

In Claim 11, line 5, before "foul" insert - and exit of - Claim 11 is rejected in the same manner as Claim 5 in view of each of

Morgan, 591,870, Oct. 19, 1897,
Class 119/42, and
Klinke, 949,653, Feb. 15, 1910,
Same class, suggesting the means to regulate.

Claim 12 is rejected on Stulik in view of Goldstein, of

Olson, 1,100,146, June 16, 1914,
X-ref. in Class 119/40, (see 4), suggesting the "means to supply vapor" and of

Christianson, 559,676, May 5, 1896,
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Same class, suggesting the means to regulate.

Claim 12 is rejected on Stulik in view of Goldstein, of

Olson, 1,100,146, June 16, 1914,
X-ref. in Class 119/40, (see 4), suggesting the "means to supply vapor" and of

Bell, 691,837, Jan. 28, 1902,
Class 119/39, suggesting the "rack".

Claim 14 is rejected on Stulik in view of Goldstein and of Christianson suggesting mounting some of the egg trays on tilting racks.

127915
14

Claims 15 and 16 are rejected on Stulik in view of Goldstein suggesting the fan, the second compartment and the continuous circulation. In Claim 16 the substituting of the curtain for the vertical partition does not involve invention.

Claim 17 is rejected on Goldstein in view of Van Keuren suggesting using the "corridor" of Goldstein(the space in which 11 is) to heat two chambers on each side, and of Bell, suggesting putting racks and trays in the side compartments. This gives the equivalent of the structure claimed.

In Claim 18, line 1, - closed - is misspelled. Lines 4 and 5, what is it that is "adapted to circulate air"?

Claim 18 is rejected on Campbell in view of Goldstein suggesting the "compartment" and "fan" to produce a continuous circulation of air. The specific mounting of the fan does not involve invention.

In Claim 19, line 4, what is the "means to produce conflux"? Claims 19 and 20, as far as understood, are rejected on Van Keuren.

In Claim 20, line 5, what is the "means to produce conflux"?

Claims 21 and 23 are rejected on VanKeuren in view of Goldstein and Christianson. This gives the equivalent of the structure claimed.

Claim 22 is rejected on Stulik in view of Goldstein suggesting the fan, of Van Keuren, suggesting the compartmented chamber and of Christianson, suggesting making some of the trays tilt.

curtain for the vertical partition does not involve invention.

Claim 17 is rejected on Goldstein in view of Van Keuren suggesting using the "corridor" of Goldstein(the space in which 11 is) to heat two chambers on each side, and of Bell, suggesting putting racks and trays in the side compartments. This gives the equivalent of the structure claimed.

In Claim 18, line 1, - closed - is misspelled. Lines 4 and 5, what is it that is "adapted to circulate air"?

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In Claim 20, line 5, what is the "means to produce conflux"?

Claims 21 and 23 are rejected on VanKeuren in view of Goldstein and Christianson. This gives the equivalent of the structure claimed.

Claim 22 is rejected on Stulik in view of Goldstein suggesting the fan, of Van Keuren, suggesting the compartmented chamber and of Christianson, suggesting making some of the trays tilt.

Claim 24 is allowed.

Claims 27 and 28 are rejected on each of Morgan, Bassini et al., Campbell, Boyd and Stulik.

CDH

mc Peck
acting Ex

12/9/15 - 15

MAIL ROOM
MAR 8
917
PATENT OFFICE

Div. 38, Room 378,

Ser. No. 127,915,

Filed October 26, 1916.

Incubators.

Samuel B. Smith.

Commissioner of Patents,

Sir:--

Amend the above application as follows:

Page 1, line 8 for the words "between 98° and 106°" substitute between 100° and 105°; line 22 change "106°" to 105°; line 24 after the word "eggs" insert the following: The temperature of circulating air should be such as will prevent the eggs in the early stage of incubation from falling below 100° and the speed or velocity of the circulating air should be such as to carry the heat away from the eggs in the later stage of incubation and thereby hold the temperature of those eggs at 105° or slightly below that. It is manifest that the temperature will remain practically the same throughout the column of eggs, but the air is impelled with sufficient velocity to carry the heat away from the eggs which happen to be in the advanced stage of incubation.

Page 5, line 9 change "98° and 106°" to read 100° and 105°.

Claim 1, line 2 change "forced" to impelled.

Claim 2, line 2 and Claim 3 line 2 [illegible]

Filed October 26, 1916.

Incubators.

Samuel E. Smith.

Commissioner of Patents,

Sir:--

Amend the above application as follows:

Page 1, line 8 for the words "between 98° and 106°" substitute between 100° and 105°; line 22 change "106°" to 105°; line 24 after the word "eggs" insert the following: The temperature of circulating air should be such as will prevent the eggs in the early stage of incubation from falling below 100° and the speed or velocity of the circulating air should be such as to carry the heat away from the eggs in the later stage of incubation and thereby hold the temperature of those eggs at 105° or slightly below that. It is manifest that the temperature will remain practically the same throughout the column of eggs, but the air is impelled with sufficient velocity to carry the heat away from the eggs which happen to be in the advancedstage of incubation.

A'

Page 5, line 9 change 98° and 106° to read 100° and 105°.

Claim 1, line 2 change "forced" to impelled.

Claim 2, line 2 and claim 3 line 2 before "about" insert the words through and.

Claim 18, line 1 correct the spelling of closed before the word "chamber"; line 5 erase all of the line and insert therefor to cause the air to circulate through the trays.

As to claims 19 and 20 means for causing the con-

flux of air currents are the flexible strips of fabric which are fully described at page 4 near the bottom thereof.

It is urged that the claims are now clear of criticisms as to form and that same represent patentable subject matter over the references.

As to claim 1 it must now be apparent that the novel method employed by applicant consists in arranging the eggs in columns and then using artificial means for impelling the air with sufficient velocity to keep the eggs in the advanced stage of incubation from becoming over-heated. The office says the last two lines of claim 1 are vague, but applicant urges that when read in the light of the specification and disclosure those lines are perfectly clear and bring out the fact that the heated air is impelled or driven so that it is adapted to the eggs in various stages of incubation. As explained in the specification, eggs near the top of the column are kept from falling below the temperature of 100° and the eggs near the bottom of the column are kept from rising materially above 105°. In other words the heated air is adapted to the condition of the eggs at the top of the column and at the bottom.

Now applicant notes that the Patent Office cites a reference to Goldstein, which does show the use of driven or impelled air in curing cigars, but certainly there is no such method suggested as employed by applicant wherein he puts articles, such as eggs, in columns and then drives the air through the column in such manner that it will produce desirable results with the articles in various stages of incubation. Applicant was not merely trying to dry or cure the eggs. He was struggling with the problem of dealing with a

items as to form and that same represent patentable subject matter over the references.

As to claim 1 it must now be apparent that the novel method employed by applicant consists in arranging the eggs in columns and then using artificial means for impelling the air with sufficient velocity to keep the eggs in the advanced stage of incubation from becoming over-heated. The office says the last two lines of claim 1 are vague, but applicant urges that when read in the light of the specification and disclosure those lines are perfectly clear and bring out the fact that the heated air is impelled or driven so that it is adapted to the eggs in various stages of incubation. As explained in the specification, eggs near the top of the column are kept from falling below the temperature of 100° and the eggs near the bottom of the column are kept from rising materially above 105°. In other words the heated air is adapted to the condition of the eggs at the top of the column and at the bottom.

Now applicant notes that the Patent Office cites a reference to Goldstein, which does show the use of driven or impelled air in curing cigars, but certainly there is no such method suggested as employed by applicant wherein he puts articles, such as eggs, in columns and then drives the air through the column in such manner that it will produce desirable results with the articles in various stages of incubation. Applicant was not merely trying to dry or cure the eggs. He was struggling with the problem of dealing with a very peculiar form of article which had within it animal life and in devising a way to apply a forced draft of heated air through such perplexing articles as eggs is certainly meritious. There is absolutely nothing in the use of impelled air with cigars which would in anyway suggest to one that it would be

of any advantage in incubating eggs.

There are a number of the claims wherein the Office overlooks the distinguishing feature of having the impelled air go through and about the individual eggs at one point in the column and at another and different point have the current of air driven about the container or trays.

Claim 6 illustrates the invention of applicant as contradistinguished from the use of a draft of air for drying or aging cigars. In that claim it appears that the eggs are arranged in tiers and the air is caused to circulate through the trays which contain the eggs in the last stages of incubation.

For the purpose of drying out or aging cigars it is apparent that there would be no necessity or advantage in driving the air through the container holding the cigars. It would be entirely sufficient to have the air circulate around the cigar containers. In fact in most cases there is simply moisture administered to the cigar container.

With the foregoing explanation it is believed that the Office will recognize the advantage brought about by applicant's invention and will allow the claims over the references.

It is therefore, urged that the claims should be allowed.

Respectfully submitted,

SAMUEL B. SMITH.

By his attorneys,

Staley & Brosman

Springfield, Ohio.
March 3, 1917.
BB/S.

Div. 38 Room 378 CDH 2-160 LDH Paper No. 4

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name.

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON March 24, 1917.

Staley & Bowman,

Gotwald Bldg.,

Springfield, O.

Please find below a communication from the EXAMINER in charge of the application of

Samuel B. Smith, Ser. No. 127,915, filed Oct. 26, 1916: Incubator.

Thomas Ewing
Commissioner of Patents.

In response to the communication filed Mar. 6, 1917:

Claim 1 is rejected on each of Bassini et al., Campbell, Bell, and Boyd, suggesting eggs in a column and heated air that rises and passes around them, in view of each of

Endemann, 120,253, Oct. 24, 1871,
Class 34/39,
Jones, 152,644, June 30, 1874,
Same class, and
Verna, 891,019, June 16, 1908,
Same class (see 5 and 6), suggesting

the "impelling" the air. The last two lines do not state clearly that eggs of various stages are put in the columns. Moreover, it would involve no invention to put eggs of various stages into the column unless it is stated that eggs of different stages are ar-

WASHINGTON

Staley & Bowman,

Gotwald Bldg.,

Springfield, O.

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Thomas Ewing
Commissioner of Pat.

6-22

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the "impelling" the air. The last two lines do not state clearly that eggs of various stages are put in the columns. Moreover, it would involve no invention to put eggs of various stages into the column unless it is stated that eggs of different stages are arranged at different levels in the column. In the incubator references the heated air is "impelled" by its inferior density. The drier references suggest assisting this impelling force.

Claims 2 and 3 are rejected in the same manner as Claim 1 in view of Winkler, suggesting eggs of various stages of incubation arranged at different places in the column of air (in Winkler air comes in through k and goes out through the openings in A) and of Christianson, suggesting some eggs in inclined planes. This gives the process claimed as it would not be inconsistent with

the process disclosed in this claim to apply heat in the middle of the column of air.

Claim 4 is rejected in the same manner as Claim 3, omitting Christianson.

Claims 5, 6 and 7 are rejected in the same manner as Claim 1 and also on each of Endemann, Jones and Verna, showing all the structure claimed.

Claims 8 and 9 are rejected in the same manner as Clai 1 in view of Christianson.

The objections to Claims 10 and 11 are repeated.

Claim 10 is rejected on Christianson as far as understood. The suspending of the device does not distinguish from Christianson.

Claim 11, as far as correct, is rejected in the same manner as Claim 5, in view of each of Morgan and Klinke. Moreover, it is rejected in the same manner as Claim 5 as the "means to regulate" need include nothing more than hand operated cutoffs which it involves no invention generally to put anywhere. In Claim 11, line 4, "uniformly" is incorrect. It can not mean that the effect on the eggs is uniform since the air cools the eggs in the lower trays (see page 4, lines 15 to 16), while it heats the upper eggs. The temperature of the air is not the same throughout the column, since the temperature is raised by the lower trays of eggs and diminished by the upper, so that the temperature is higher part way up the tier at either the top or the bottom.

Claim 11 is further objected to as the structure which applicant intends to include by the phrase "means to heat uniformly" is already partly included by the fan and "means to operate".

Claim 12 is rejected on the same references as Claim 1 in view of Olson, of record

Claim 13 is rejected in the same manner as Claim 5.

In Claims 11 and 13 the trays of the references are supported by cleats which anticipate the "racks" as claimed. Racks to support trays are common generally and are shown moreover in Bell.

In Claim 14, line 5, what is the "space between the racks and tiers"? If these tiers are those numbered 12, they should be better defined in the claim. This claim can not be well understood in its present form but seems to be met by the same references as Claim 9.

Claim 15 is rejected on each of Bassini et al., Campbell, Bell and Boyd in view of each of Jones et al. and Verma, suggesting the continuous circulation and also on each of Jones et al. and Verma, alone.

Claim 16 is rejected in the same manner as Claim 15. The curtain is not patentably different from any partition.

Claim 17 is rejected as for an incomplete combination as it does not bring out the structure definitely enough to show that the fan circulates air through the compartments or that air from the compartments goes into the air distributing space. As far as this claim states, the curtain might make a tight closure between the corridor and the compartments or they might let air from the corridor to the compartments at the top thereof. When this claim is made sufficiently definite, it will probably be allowed.

Claim 18 is not understood. What is it that is "adapted to cause"?

Claim 18 is rejected in the same manner as Claim 5, the specific location of the fan not involving invention.

In Claim 19, line 4, and Claim 20, line 5, "means to produce conflux" is incorrect as the word "conflux" is defined by the standard dictionary to mean - "flowing together". There is no

"flowing together" at the bottom of the trays.

Claims 19 and 20 as far as correct are rejected in the same manner as Claim 15. Applicant has put drawers 6 in both compartments 4 and 5 of the Verna device. In these and other claims, to provide a plurality of compartments in the incubators would not involve invention even without its being suggested by Jones et al.,and Verna.

Claims 21, 22,23 and 24 are rejected in the same manner as Claim 8. The word "flexible" does not patentably distinguish Claims 21 and 23 from the references. To make some racks stationary and some tiltable as claimed does not involve invention unless it is stated that eggs are first put in the upper rack and moved down and that the air flows upward through the whole length of the racks and is not heated by additional heating means during its flow through the racks. Such amendments to Claim 22 are necessary to bring out the operation stated in the specification. In Claim 24 the arrangement of the "central corridor" and "air distributing space" does not involve invention. Claim 24 moreover does not state that the curtains permit any circulation of air from the corridor to the racks. This circulation of air should be included and defined.

Claim 25 is rejected in the same manner as Claim 1.

Claim 26 is rejected in the same manner as Claim 1 and also on each of Bassini et al., Campbell, Bell and Boyd alone. As far as this claims and Claims 27 and 28 disclose,eggs of various stages of incubation might be mingled in the same tray.

Claims 27 and 28 are rejected in the same manner as Claim 1. The "thermostatic means" is common in all incubators as shown in almost all the references of record.

"blowing together" at the bottom of the trays.

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Claims 27 and 28 are rejected in the same manner as Claim 1. The "thermostatic means" is common in all incubators as shown in almost all the references of record.

As the references indicate, applicant has new matter in his application, but has not limited his claims sufficiently to bring it out.

CDH

G. A. Ide, Exr.

Div. 38 Room 378

Ser. No. 127,915

Filed October 26th, 1916

INCUBATOR

S. B. Smith.

Commissioner of Patents,

Sir:-

Amend the application as follows:-

Claim 1 line 2 after the first word in the line insert the words of various stages of incubation; same line after "column" insert the eggs in different stages of incubation being in different levels.

Claim 2 line 3 after "eggs" (first word in the line) insert the words the air being impelled from the bottom upwardly; line 4 erase "at one place in" and insert the words at the upper part of.

Claim 3 line 3 after "eggs" (first time mentioned) insert the words the air being impelled upwardly throughout the column of eggs.

Claim 4 line 3 after "same" insert the words from the bottom of said column upwardly toward the top thereof.

Claim 5 line 3 after the word "trays" insert the words the said fan being arranged to force the air from the bottom of the chamber upwardly around the trays to the top thereof.

Claim 6 line 2 after "tiers" insert the words eggs at various stages of incubation; after the word "incubation" line 4 insert the words consisting of a fan arranged at the top of the

Div. 38 Room 378

Ser. No. 127,915

Filed October 26th, 1916

INCUBATOR

S. B. Smith.

Commissioner of Patents,

Sir:-

Amend the application as follows:-

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B Pur C

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Claim 3 line 3 after "eggs" (first time mentioned) insert the words the air being impelled upwardly throughout the column of eggs.

Claim 4 line 3 after "same" insert the words from the bottom of said column upwardly toward the top thereof.

Claim 5 line 3 after the word "trays" insert the words the said fan being arranged to force the air from the bottom of the chamber upwardly around the trays to the top thereof.

B' Pur C

Claim 6 line 2 after "tiers" insert the words eggs at various stages of incubation; after the word "incubation" line 4 insert the words consisting of a fan arranged at the top of the chamber and arranged to impel the air from a point at the bottom of the trays to a point at the top thereof.

B³ Pur C

Claim 7 line 4 insert after "trays" an air passage-way near the bottom of the trays whereby the air will be impelled from the bottom of the tier of trays to the top thereof.

B⁴ Pur C

Claim 8 line 4 after "rack" insert the words said circulating means consisting of mechanically operated device arranged at the top of the column for impelling the air downwardly and a passageway at the bottom of the column for impelling the air from the bottom of the chamber towards said tilting rack and thereafter upwardly.

Claim 9 line 4 after the word "positions" insert the words said circulating means comprising aprons for causing the air to circulate from the bottom of the chamber upwardly.

Claim 10 line 6 after "positions" insert the words and means for impelling the air to circulate from the bottom of the incubator upwardly through said racks.

Claim 11 line 2 after the word "air" insert the words from the bottom of the chamber; line 4 erase the word "uniformly" and insert the words in accordance with the particular stage of incubation of the eggs; after "chamber " same line insert consisting in part of passageways near the bottom of the chamber.

Erase claims 13, 14, 15 and 16.

Claim 17 line 4 after the word "space" insert the words an air passageway near the bottom of said chamber for impelling the air within the compartments whereby it will circulate upwardly.

Claim 18 line 3 after "egg-trays" insert having therein eggs in various stages of incubation; line 4 erase the words " having open communication "down to and including the end of the claim and insert therefore an air passageway located near the bottom of said tiers of trays and communicating with said fan compartment whereby the air will be impelled by the fan to circulate from the bottom of the tier of trays to the top thereof..

Erase claims 19, 20, 21, 22, 23, 25, 26, 27 and 28.

Claim 24 line 4 after the word "corridor" insert

B5 said circulating means consisting of mechanically operated device arranged at the top of the column for impelling the air downwardly and a passageway at the bottom of the column for impelling the air from the bottom of the chamber towards said tilting rack and thereafter upwardly.

Claim 9 line 4 after the word "positions" insert the words said circulating means comprising aprons for causing the air to circulate from the bottom of the chamber upwardly.

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Claim 11 line 2 after the word "air" insert the words from the bottom of the chamber; line 4 erase the word "uniformly" and insert the words in accordance with the particular stage of incubation of the eggs; after "chamber " same line insert consisting in part of passageways near the bottom of the chamber.

Erase claims 13, 14, 15 and 16.

Claim 17 line 4 after the word "space" insert the words an air passageway near the bottom of said chamber for impelling the air within the compartments whereby it will circulate upwardly.

Claim 18 line 3 after "egg-trays" insert having therein eggs in various stages of incubation; line 4 erase the words "having open communication "down to and including the end of the claim and insert therefore an air passageway located near the bottom of said tiers of trays and communicating with said fan compartment whereby the air will be impelled by the fan to circulate from the bottom of the tier of trays to the top thereof..

Erase claims 19, 20, 21, 22, 23, 25, 26, 27 and 28.

Claim 24 line 4 after the word "corridor" insert the words arranged to permit the air to circulate from the bottom of the chamber into the part of the chamber behind the curtains.

It is urged that the claims are now corrected to being out the invention disclosed by applicant and it is urged that the same should be allowed.

Respectfully submitted

SAMUEL B. SMITH

By his attorneys,

Staley & Bowman

Springfield, Ohio.

April 5th, 1917.

BB/AB

26

Div. 38 Room 378 CDH LDH Paper No. 6 899

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name.

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON April 12, 1917.

Staley & Bowman,

Gotwald Bldg.,

Springfield, O.

Please find below a communication from the EXAMINER in charge of the application of

Samuel B. Smith, Ser. No. 127,915, filed Oct. 26, 1916: Incubators.

Thomas Ewing
Commissioner of Patents.

In response to the communication filed April 7, 1917:

Claims 1 and 4 are rejected on the same references as in the last office action, taken with Winkler, which suggests trays arranged with the newest at top and oldest at bottom but with heaters in the middle of the column. This would give the method claimed.

Claims 2 and 3 are rejected in the same manner as Claim 1 in view of Christianson.

Claim 5 is rejected on each of Bassini et al., Campbell, Bell and Boyd in view of each of Endermann, Jones and Verna, showing the fan.

Claims 6 and 7 are rejected in the same eanner as Claim 1 and also in the same manner as Claim 5. The specific location of the fan does not involve invention.

Claims 8 and 10 are rejected in the same manner as Claim 6 in view of Christianson.

Staley & Bowman,

Gotwald Bldg.,

Springfield, O.

Please find below a communication from the **EXAMINER** *in charge of the application of*

Samuel B. Smith, Ser. No. 127,915, filed Oct. 26, 1916: Incubators.

Thomas Ewing
Commissioner of Patents.

In response to the communication filed April 7, 1917:

Claims 1 and 4 are rejected on the same references as in the last office action, taken with Winkler, which suggests trays arranged with the newest at top and oldest at bottom but with heaters in the middle of the column. This would give the method claimed.

Claims 2 and 3 are rejected in the same manner as Claim 1 in view of Christianson.

Claim 5 is rejected on each of Bassini et al., Campbell, Bell and Boyd in view of each of Endermann, Jones and Verna, showing the fan.

Claims 6 and 7 are rejected in the same eanner as Claim 1 and also in the same manner as Claim 5. The specific location of the fan does not involve invention.

Claims 8 and 10 are rejected in the same manner as Claim 6 in view of Christianson.

Claim 9 is objected to as the aprons do not cause the air to circulate upwardly unless they and the fan are more definitely located. Claim 9 is rejected in the same manner as Claim 8, omitting Endermann and Jones. Moreover, it is noticed

127915
26

that in Fig. 2 of Verna the partition at the right of 16 has the same function as applicant's "apron" and might be made of cloth instead of wood or metal.

In Claim 10,line 4, "equalizing" is not understood.

Claim 11 is rejected on the same references as Claim 1 in view of Morgan and Klinke showing "means to regulate" and also in the same manner as Claim 1 as the "means to regulate" involves no invention. The references from Class 34 show the fan and passageways. The phrase "means to heat the eggs in accordance with the particular stage of incubation of the eggs" is not very definite and is certainly shown in Winkler.

Claim 12 is rejected on the same references as Claim 5 in view of Olson, suggesting "means to supply".

Claim 13, original 17, should state that the air distributing space communicates with the corridor and the compartments, that there are two "air passageways" and that they connect the corridor with the compartments. When these, which applicant probably meant to include, have been included, this claim will probably be allowed.

Claim 14, original 18, is rejected in the same manner as Claim 6.

Claim 15, original 24, will probably be allowed if it is stated that the "air distributing space" communicates with both the corridor and the parts of the chambers behind the curtains.

Claim 11 is rejected on the same references as Claim 1 in view of Morgan and Klinke showing "means to regulate" and also in the same manner as Claim 1 as the "means to regulate" involves no invention. The references from Class 34 show the fan and passageways. The phrase "means to heat the eggs in accordance with the particular stage of incubation of the eggs" is not very definite and is certainly shown in Winkler.

Claim 12 is rejected on the same references as Claim 5 in view of Olson, suggesting "means to supply".

Claim 13, original 17, should state that the air distributing space communicates with the corridor and the compartments, that there are two "air passageways" and that they connect the corridor with the compartments. When these, which applicant probably meant to include, have been included, this claim will probably be allowed.

Claim 14, original 18, is rejected in the same manner as Claim 6.

Claim 15, original 24, will probably be allowed if it is stated that the "air distributing space" communicates with both the corridor and the parts of the chambers behind the curtains.

CDH

G. R. Lee,
Exr.

1279/5

27.

Div. 38, Room 378,

Ser. No. 127,915,

Filed October 26, 1916,

Incubators.

Samuel B. Smith.

Commissioner of Patents,

Sir:--

Erase the claims 1 to 12 16

and substitute the following:

1. The method of hatching eggs by arranging the eggs in various stages of incubation in a column, the eggs in different stages of incubation being in different levels, and applying heated air driven at a predetermined speed about the eggs whereby the heated air will be adapted to eggs in various stages of incubation.

2. The method of hatching eggs by arranging in one chamber eggs in various stages of incubation, the eggs in different stages of incubation being in different parts of said chamber, and applying heated air driven at a predetermined speed or velocity about all the eggs whereby the heated air will be adapted to eggs in various stages of incubation.

3. The method of hatching eggs, consisting of arranging eggs in various stages of incubation in an enclosure, the eggs in different stages of incubation being placed in different levels, and applying heated air to said eggs, said heat-

Ser. No. 127,915.

Filed October 26, 1916.

Incubators.

Samuel B. Smith.

Commissioner of Patents,

Sir:--

16

Erase the claims 1 to 12

and substitute the following:

1. The method of hatching eggs by arranging the eggs in various stages of incubation in a column, the eggs in different stages of incubation being in different levels, and applying heated air driven at a predetermined speed about the eggs whereby the heated air will be adapted to eggs in various stages of incubation.

2. The method of hatching eggs by arranging in one chamber eggs in various stages of incubation, the eggs in different stages of incubation being in different parts of said chamber, and applying heated air driven at a predetermined speed or velocity about all the eggs whereby the heated air will be adapted to eggs in various stages of incubation.

3. The method of hatching eggs, consisting of arranging eggs in various stages of incubation in an enclosure, the eggs in different stages of incubation being placed in different levels, and applying heated air to said eggs, said heated air being driven by mechanical means at a predetermined speed about the eggs to maintain same at a maximum degree of temperature of 105° and a minimum degree of 100°.

4. The method of hatching eggs by arranging eggs in

various stages of incubation in an enclosure and placing eggs in different stages of incubation in different places in the enclosure, and thereafter forcing heated air at a predetermined speed or velocity about all the eggs whereby the eggs in the most advanced stages of incubation will be maintained at a degree of temperature less than 105° by the velocity of heated air, substantially as specified.

5. The method of hatching eggs by arranging eggs in various stages of incubation in an enclosure andplacing the eggs in different stages of incubation in different places in the enclosure, and thereafter driving the heated air by mechanical means at a predetermined speed about all of the eggs and driving same through and between the eggs in the more advanced stage of incubation whereby the temperature of said eggs will be maintained at something less than 105° temperature, for the purpose specified.

6. The method of hatching eggs by arranging eggs in various stages of incubation in an enclosure and placing the eggs in different stages of incubation in different places in the enclosure, and thereafter driving the heated air by mechanical means at a predetermined speed about all of the eggs and driving same through and between the eggs in the more advanced stage of incubation whereby the temperature of said eggs will be maintained at something less than 105° temperature, said eggs in the more advanced stages of incubation being arranged in tilted position, for the purpose specified.

7. In an incubator, a chamber and trays for eggs arranged in tiers therein, means for applying heated air to said eggs, said circulating means comprising a mechanically operated device arranged at the top of the chamber for driving air downwardly and giving to said air a predetermined

speed or velocity whereby the eggs throughout the chamber will be maintained at a degree of temperature varying from 100° to 105°, the eggs in the more advanced stages of incubation being arranged at the point where the air is first applied to the eggs for the purpose specified.

Renumber claims 13 as No. 8 and at line 2 after the word "thereof" insert the following: a plurality of air passageways connecting said corridor with said compartments.

Erase claims 14

Claim 15, line 4 after the word " curtain" insert passageways connecting the air distributing space with the corridor and the parts of said chamber behind the curtains.

- - - - - -

It is urged that the claims as now presented are clear of the references and same should be allowed.

The method employed by applicant is distinctly different from the method employed in the references and the claims are now drawn particularly to a method of hatching eggs as contradistinguished from drying fruits or other articles. While it is true that in Winkler the eggs are in various stages of incubation and have heated air applied to them, there is no conception of applying the heated air with a predetermined speed or velocity that will adapt the heated air to the eggs in various stages of incubation. In Winkler's method there isn't any suggestion of giving heated air any predetermined speed or velocity. There is merely employed water jackets which heat the eggs and also the eggs move from place to place by means of carriers. It is obvious that the eggs in the advanced stages of incubation are not kept from advancing beyond the desirable temperature by the employment of any driving means for the heated air. The only mechanically operated mechanism in Winkler is the mechanism

for driving the eggs and that is distinctly different from applicant's conception which is that of driving the air in a way that will make it adapted to the eggs in all stages of incubation.

Now the references show the fans used for drying fruits, meats and similiar substances and do not in anyway suggest that there would be any advantage in using applicant's method of driving heated air with a predetermined velocity about the eggs that are in various stages of incubation. In drying fruits and meats it is merely necessary to have the air circulate about the fruits or means and that is the only purpose of using the fan whereas in applicant's method it is important to have the speed of the fan properly co-related to the heated eggs and by giving to the fan a predetermined velocity the eggs in the most advanced stages of incubation are prevented from becoming over heated.

It is believed that applicant has made a valuable contribution to the art of hatching eggs and he certainly does not claim to have attemplated anything in the art of drying fruits or meats and it is therefore urged that the claims should be allowed.

Respectfully submitted,

SAMUEL B. SMITH,

By his attorneys,

Blakely & Sokoloff

Springfield, Ohio.

April 20th, 1917.

BB/S.

Div. 38 Room 378 CDH ~~and~~ LDH Paper No. 8

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name.

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON May 3, 1917.

Staley & Bowman,

Gotwald Bldg.,

Springfield, O.

Please find below a communication from the EXAMINER in charge of the application of

Samuel B. Smith, Ser. No. 127,915, filed Oct. 26, 1916: Incubators.

Thomas Ewing

Commissioner of Patents.

In response to the communication filed April 23, 1917:

Claims 1 and 2 are rejected on each of Morgan, Perkins, Boyd and Stulik in view of Winkler. In each of the first four references the temperature of the heated air in the column is kept the same by the thermostat that controls the heater which drives the air, so that the speed of driving the air is predetermined by adjusting the thermostat. Winkler suggests the "eggs in different stages of incubation being in different levels".

Claims 3, 4 and 5 are rejected in the same manner as Claim 1 in view of each of Endemann, Jones et al., and Verna, suggesting the "mechanical means".

Claim 6 is rejected on Perkins in view of Winkler

Staley & Bowman,

Gotwald Bldg.,

Springfield, O.

Please find below a communication from the EXAMINER in charge of the application of

Samuel B. Smith, Ser. No. 127,915, filed Oct. 26, 1916: Incubators.

Thomas Ewing
Commissioner of Patents.

6—5211

In response to the communication filed April 23, 1917:

Claims 1 and 2 are rejected on each of Morgan, Perkins, Boyd and Stulik in view of Winkler. In each of the first four references the temperature of the heated air in the column is kept the same by the thermostat that controls the heater which drives the air, so that the speed of driving the air is predetermined by adjusting the thermostat. Winkler suggests the "eggs in different stages of incubation being in different levels".

Claims 3, 4 and 5 are rejected in the same manner as Claim 1 in view of each of Endemann, Jones et al., and Verna, suggesting the "mechanical means".

Claim 6 is rejected on Perkins in view of Winkler and the references from Claim 34 and of Perkins suggesting the tilting of some of the eggs.

Claim 7 is rejected in the same manner as Claim 3. Winkler anticipates the last three lines.

Claim 8, original 17, is objected to as the passageways upwards under the curtains are included twice, once in the amendment of April 23, and once in the amendment of April 7. This claim should be rewritten.

Claim 9, original 24, is allowed.

C.D.W.

G. A. Lee, Ex.

Div. 38 Room 378

Ser. No. 127,915

Filed October 26th, 1916.

INCUBATORS

Samuel B. Smith.

Commissioner of Patents,

Sir:-

Please recognize Percy Norton of Springfield Ohio as our associate in the further prosecution of the above entitled application.

Attorneys for Smith

34

Springfield, Ohio.

June 13th, 1917.

ClW/B

127,915

Div. 38, Room 378,

Ser. No. 127,915,

Filed October 26th, 1916.

Incubators.

Samuel B. Smith.

Commissioner of Patents,

Sir:--

Amend the application as follows:

Erase claims 1 to 8 inclusive and insert the following:

1. The method of hatching a plurality of eggs in different stages of incubation by subjecting all of said eggs to heated air and by supplementing the natural draft of the heated air with the forced draft to increase the velocity of heated air about the eggs without changing the temperature of heated air whereby the units of heat will be carried from the eggs in the more advanced stage of incubation to those in a less advanced stage.

2. The method of hatching a plurality of eggs in different stages of incubation by subjecting all of said eggs to heated air and by using a forced draft to increase the velocity of heated air without changing the temperature whereby the units of heat will be carried away from the

Div. 38, Room 376,

Ser. No. 127,915.

Filed October 26th, 1916.

Incubators.

Samuel B. Smith.

Commissioner of Patents,

Sir:--

Amend the application as follows:

Erase claims 1 to 8 inclusive and insert the following:

1. The method of hatching a plurality of eggs in different stages of incubation by subjecting all of said eggs to heated air and by supplementing the natural draft of the heated air with the forced draft to increase the velocity of heated air about the eggs without changing the temperature of heated air whereby the units of heat will be carried from the eggs in the more advanced stage of incubation to those in a less advanced stage.

Sub E²

2. The method of hatching a plurality of eggs in different stages of incubation by subjecting all of said eggs to heated air and by using a forced draft to increase the velocity of heated air without changing the temperature whereby the units of heat will be carried away from the eggs in the more advanced stage of incubation to these in a less advanced stage for the purpose specified.

3. The method of hatching a plurality of eggs in different stages of incubation by subjecting all of said eggs to heated air and by supplementing a draft produced by mechanical means to increase the velocity of the air

without increasing the temperature thereof whereby the units of heat will be carried from eggs in more advanced stage to those in the less advanced stage of incubation.

Renumber claim 9 making it claim 4.

- - - - - - -

Pursuant to the interview with the examiner on Thursday of last week the following argument is repeated in support of the three new claims now submitted. The common practice of incubation has been to assemble the eggs with a heater in close proximity overhead and as the eggs advance in incubation the heat or radiation is diminished or the eggs moved away from the heater as they advance in incubation. In attempting to hatch a plurality of eggs arranged in trays one above the other it has been found that no matter where the heater is placed when the natural draft is employed, the difference in temperature between the upper and lower parts of the egg chamber is so great as to destroy the eggs. A great many experiments havebeen made to provide a natural draft that would equalize the temperature, but the best that could be accomplished disclosed a difference of about fifteen degrees between the upper and lower part of the egg chamber, whereas when a forced draft was employed a substantially equal temperature was maintained throughout the chamber, showing that the essential feature of the invention is a forced draft and applicant seems to be the first to employ a forced draft.

The references from remote arts in which a forced draft is employed for drying meats, vegetables, fruits, tobacco, etc., afford no suggestion as to meeting the condition of the advancing incubation of eggs.

Applicant seems to be the first to discover this essential feature and it has produced a great and successful change in the art. Indeed it has revolutionized poultry industry for applicant has had in successful operation

operation for the year last past a large incubator hatching thousands of eggs by which he continuously hatches eggs in great quantities giving him an output of chicks which, by reason of the reduced equipment less space is required for it and fewer attendants to operate it, so vastly decreases the cost of production over the old method that he has been able to sell the chicks to Five and Ten Cent stores throughout the country at such prices that they can and do retail them at ten cents each.

It is therefore urged that the claims should now be allowed and an early allowance is respectfully urged.

Respectfully submitted,

SAMUEL B. SMITH.

By his attorneys,

Staley & Bowman

Springfield, Ohio,
June 26th, 1917.
BB/S.

Div. 38 Room 378 CDH 2—, 9, LDH Paper No. 11

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name.

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON June 30, 1917.

Percy Norton,

Springfield,

O.

Please find below a communication from the EXAMINER in charge of the application of

Samuel B. Smith, Ser. No. 127,915, filed Oct. 26, 1916: Incubators.

Thomas Ewing

r 6—3821

In response to the communication filed June 28, 1917:

In Claim 1, line 4, change the first "the" to - a -

Attention is called to Figs. 1 to 5, inclusive, and 7 of

Koons, 916,454, Mar. 30, 1909,
Class 119/40, in which, if the pipes 54 were omitted, there would be a "natural draft" around 12, through 8 and out of the egg chamber as indicated by the arrows in Fig.1. The use of the pipes 54 adds a "forced draft" that increases the speed of the air but does not heat the air in 1. To arrange the eggs on the trays so that the air will first strike the eggs in the more advanced stage and then those in the less advanced stage is suggested by Winkler.

Claims 1, 2 and 3 are rejected as explained and also on

Scott, 709,650, Sept. 23, 1902,
Class 119/40, having a "forced draft" produced by 22 in view of Winkler suggesting using a plurality of trays to produce the mode of operation in the last three lines. These claims are also rejected on Boyd in view of each of Scott

Percy Norton,

Springfield,

O.

Please find below a communication from the EXAMINER in charge of the application of

Samuel B. Smith, Ser. No. 127,915, filed Oct. 26, 1916: Incubators.

Thomas Ewing

r 6—2831

In response to the communication filed June 28, 1917:

In Claim 1, line 4, change the first "the" to - a -

Attention is called to Figs. 1 to 5, inclusive, and 7 of

Koons, 916,454, Mar. 30, 1909,
Class 119/40, in which, if the pipes 54 were omitted, there would be a "natural draft" around 12, through 8 and out of the egg chamber as indicated by the arrows in Fig.1. The use of the pipes 54 adds a "forced draft" that increases the speed of the air but does not heat the air in 1. To arrange the eggs on the trays so that the air will first strike the eggs in the more advanced stage and then those in the less advanced stage is suggested by Winkler.

Claims 1, 2 and 3 are rejected as explained and also on

Scott, 709,650, Sept. 23, 1902,
Class 119/40, having a "forced draft" produced by 22 in view of Winkler suggesting using a plurality of trays to produce the mode of operation in the last three lines. These claims are also rejected on Boyd in view of each of Scott and Koons suggesting connecting the part K of Boyd to the heater to get a forced draft and of Winkler, suggesting putting the more advanced eggs in the lower tray.

In Claim 3, "mechanical means" does not distinguish from

Ser. No. 127,915.....2.

the structure of the references. Even if it did, there would be no invention in a method claims, in substituting a fan for the draft forcing means of Koons and Scott.

Claim 4, original 24, stands allowed.

CDH

G. R. Lee,
Exr.

925

Affidavits & Exhibits

Div. 38 Room 378

Application No. 127,915

Filed October 26th, 1916.

INCUBATORS

Samuel B. Smith.

Commissioner of Patents,

Sir:-

Please amend the above entitled application as follows:-

Line 23, page 4 after "Fig. 3" insert The outlets 28 for the release of foul air are made of such restricted capacity as to prevent the undue escape of moisture. It is possible to limit the openings and so conserve the moisture by reason of the vitalizing effect of the power driven current upon the body of the air within the chamber.

E 1

Please place the numeral 28 with proper lead lines on Figs. 1 and 3 of the drawings to indicate outlets as per order sent herewith.

Substitute the following for claims 1, 2 and 3.

E 2

1. The method of hatching a plurality of eggs by arranging them at different levels in a closed chamber having restricted openings of sufficient capacity for the escape of foul air without undue loss of moisture and applying a current of heated air, said current being created by means other than variations of temperature and of sufficient velocity to circulate, diffuse and maintain the air throughout the chamber at substantially the same temperature, whereby the air will be vitalized, the moisture conserved and the

Application No. 127,915

Filed October 26th, 1916.

INCUBATORS

Samuel B. Smith.

Commissioner of Patents,

Sir:-

Please amend the above entitled application as follows:-

Line 23, page 4 after "Fig. 3" insert The outlets 28 for the release of foul air are made of such restricted capacity as to prevent the undue escape of moisture. It is possible to limit the openings and so conserve the moisture by reason of the vitalizing effect of the power driven current upon the body of the air within the chamber.

Please place the numeral 28 with proper lead lines on Figs. 1 and 3 of the drawings to indcate outlets as per order sent herewith.

Substitute the following for claims 1, 2 and 3.

1. The method of hatching a plurality of eggs by arranging them at different levels in a closed chamber having restricted openings of sufficient capacity for the escape of foul air without undue loss of moisture and applying a current of heated air, said current being created by means other than variations of temperature and of sufficient velocity to circulate, diffuse and maintain the air throughout the chamber at substantially the same temperature, whereby the air will be vitalized, the moisture conserved and the units of heat will be carried from the eggs in the more advanced stage of incubation to those in a less advanced stage for the purpose specified.

2. The method of hatching a plurality of eggs by arranging them at different levels in a closed chamber having restricted

openings of sufficient capacity for the escape of foul air without undue loss of moisture and applying a power driven current of heated air in an adjacent chamber through openings into the egg chamber, said current being of sufficient velocity to circulate, diffuse and maintain the air throughout the egg chamber at substantially the same temperature, whereby the air will be vitalized, the moisture conserved and the units of heat will be carried from the eggs in the more advanced stage of incubation to those in a less advanced stage for the purpose specified.

3. The method of hatching a plurality of eggs by arranging them at different levels in a closed chamber having restricted openings of sufficient capacity for the escape of foul air without undue loss of moisture and applying a vertically directed current of heated air in an adjacent chamber to circulate in said egg chamber through upper and lower openings between said chambers, said current being created by mechanically moving means of such velocity as to diffuse and maintain the air throughout the egg chamber at substantially the same temperature whereby the air will be vitalized, the moisture conserved and the units of heat will be carried from the eggs in the more advanced stage of incubation to those in the less advanced stage for the purpose specified. ale 3527

Please add the following claim:-

5. In an incubator, a closed chamber with a vertically disposed partition to provide a corridor having upper and lower passage ways to said chamber, egg trays arranged at different levels in said chamber, a power driven fan creating a current in said corridor to circulate through said passage ways and egg trays, said chamber having restricted openings of sufficient capacity for the discharge of foul air without undue loss of moisture and means to heat the air circulated through said chamber. (Orig. "

- - - -

Natural drafts seek and follow the same paths and when employed in incubators leave untouched areas of the egg chamber. This causes an uneven distributior of the heat and a variation of tempera-

ture that makes it impossible to successfully hatch eggs placed at different levels; and this is equally true of induced drafts caused by heating outlet pipes of the egg chamber. Convincing proof of this is found in the affidavit of George Cugley filed herewith.

Applicant by the introduction of a current produced by mechanical means distributes and diffuses the heat throughout the egg chamber and gives an even temperature in all parts of the chamber whereby it is possible to place the eggs at different levels; but this is not all; it is essential that a sufficient amount of moisture be retained for successful incubation and to that end the outlets for escape of foul air are restricted. The vitalizing effect of agitating the air within the chamber by a power driven current makes possible the use of restricted outlets and the moisture is thereby conserved within the chamber.

The induced drafts of the new references are for the purpose of freeing the incubator of foul air. Such drafts not only follow certain paths leaving areas of the chamber untouched as heretofore pointed out; but they entirely exhaust the moisture from the egg chamber and thereby destroy the hatch. There is a vast difference - just the difference that distinguishes success from failure - between the old art of natural and induced drafts and the power driven current of applicant with its restricted outlets giving a uniform temperature, vitalizing the air and conserving the moisture in the air within the egg chamber.

While it is true the egg conveyor of Winkler is arranged with one section above another he depends entirely on having a separate heater for each section adapted to the stage of incubation of the eggs in its section. Furthermore although his patent was issued as far back as 1883 his construction is not known on the market today showing it could not have been a success. It lacks the essential features that have made the device of applicant a success.

The so-called Mammoth Incubators of recent years are all made with the egg trays in the same horizontal plane. In other words, the old units are simply multiplied each having a

single tray, the combination making an incubator of great length, whereas by the method of applicant the egg trays can be placed in column allowing the incubator to be built in compact form, so that the material employed, cost of construction and space required is vastly less and the cost of fuel and attendants to operate is proportionately reduced.

Applicant's incubator is clearly distinguished in that a power driven current is employed to establish a uniform temperature throughout the area of the egg chamber whereby the eggs can be placed at different levels and the restricted outlets conserve the moisture in the chamber, this restriction and conservation being made possible by the vitalizing effect of the power driven current.

Applicant has discovered a new method of successfully hatching eggs continuously in large numbers and should be protected in it. An allowance is respectfully urged.

Respectfully,

SAMUEL B. SMITH

By his attorneys,

Springfield, Ohio.
February 9th, 1918.

Div. 38 Room 378

Appln. No. 127,915

Filed October 26th, 1916.

INCUBATORS

Samuel B. Smith

State of ~~Ohio~~ Pennsylvania, County of ~~Cuyahoga~~ Philadelphia, ss;

Samuel B. Smith being duly sworn deposes and says he is the applicant in the above entitled application; that the subject-matter of the foregoing amendment was part of his invention, was invented before he filed his original application, above identified, for such invention, was not known or used before his invention, was not patented or described in a printed publication in any country more than two years before his application, was not patented in a foreign country on an application filed more than twelve months before his application, was not in public use or on sale in this country for more than two years before the date of his application and has not been abandoned.

Samuel B Smith

Sworn to and subscribed before me this 14th day of February 1918.

Stella Irwin
Notary Public

9

State of Ohio,)
) SS
Clark County,)

George Cugley being first duly sworn says that he has been for many years engaged in the incubator business both as a dealer and manufacturer; that he is president of the Buckeye Incubator Company, of Springfield, Ohio, and gives his active personal attention to the conduct of the business including experimental work and the adopting of improvements in the product of said company; that said company has been engaged in the manufacture of incubators for 26 years and has constantly been engaged in making experiments with various types of incubators and that to his knowledge other manufacturers have been engaged in like manner; that it is a matter of common knowledge to those familiar with the art that to successfully hatch eggs they must be maintained at substantially the same temperature throughout the period of incubation; that all attempts to obtain a satisfactory hatch from eggs placed at different levels in a chamber having natural drafts or drafts induced by variation in temperature have been a failure for the reason that such drafts seek and follow the same paths leaving areas of the chamber untouched so that the same temperature cannot be maintained at different levels in the chamber; and as convincing proof of this affiant points to the fact that all manufacturers of incubators today, other than affiant's company which is building incubators in accordance with the device of applicant, place the eggs on the same level and this is true even in the so called Mammoth Incubator of recent years which simply multiply the units and place all the eggs of the several units on the same level.

Affiant further says that United States Letters Patent No.916454 granted V.C. Koons, March 30, 1909, having been called to his attention he constructed an incubator in accordance with the invention of said patent and conducted a series of experiments

with same; that he had photographs made of said incubator and the same are hereto attached marked Nos. 1, 2, 4 and 5 and further had a phantom drawing made which is hereto attached and marked No. 3; that No. 1 is an outside view, No. 2 is same with door open showing interior with three egg trays, No. 4 shows the position of the thermometers in each tray, No. 5 shows bottom of single tray with the position of the thermometers in said tray, the position of the thermometers being alike in each tray and No. 3 is a phantom view showing the heating device 1 with its heating drum 2 projecting into the heating chamber of the incubator, 3 is a water pan having openings 4 for escape of moisture, 5 are the egg trays, 6 are the fresh air inlets, 7 the air passages from the heating chamber to the egg chamber, and 8 the outlet tubes opening into a jacket 9 formed about the chimney of heater 1.

Affiant further says that during a period extending from September 19th to October 9, 1917, he operated said incubator making a series of tests, records of which are shown in Charts marked A, B, C, D. and E hereto attached by which it will be seen there was a wide variation of temperature both vertically and horizontally in the egg chamber showing that eggs could not be successfully hatched; and affiant particularly points out that in the test of September 21, 1917, marked "A" and the test of October 9, 1917, marked "E" were made with the outlet tubes removed, whereas the test of September 27, 1917, marked "B", September 29, 1917, marked "C" and October 3, 1917, marked "D" were made with the outlet tubes in place showing the induced drafts of the patent created a greater variation of temperature in the egg chamber which would be more disastrous to the hatch than when natural drafts were employed.

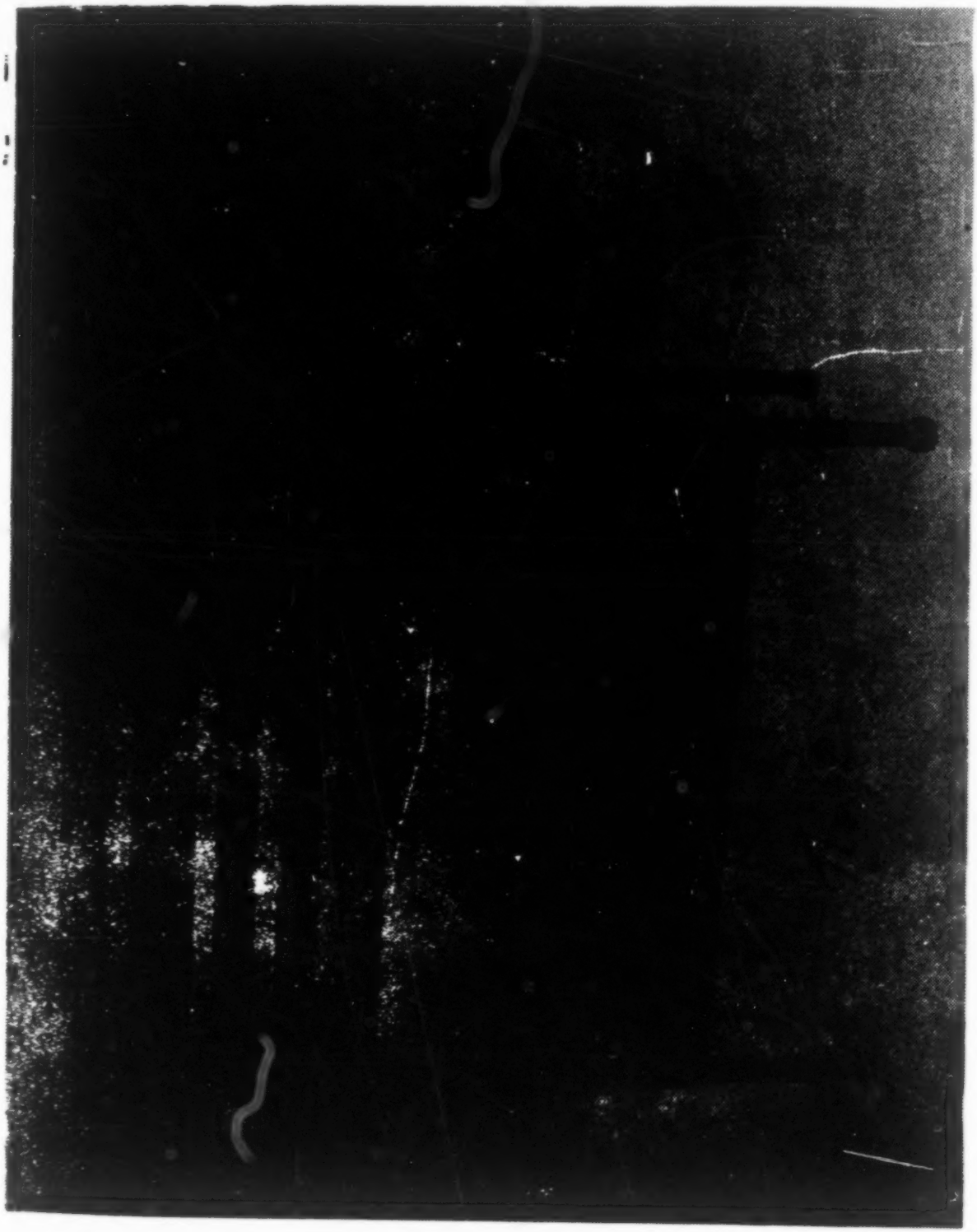
Affiant further says that moisture in the egg chamber is an essential element of a successful hatch and that an induced

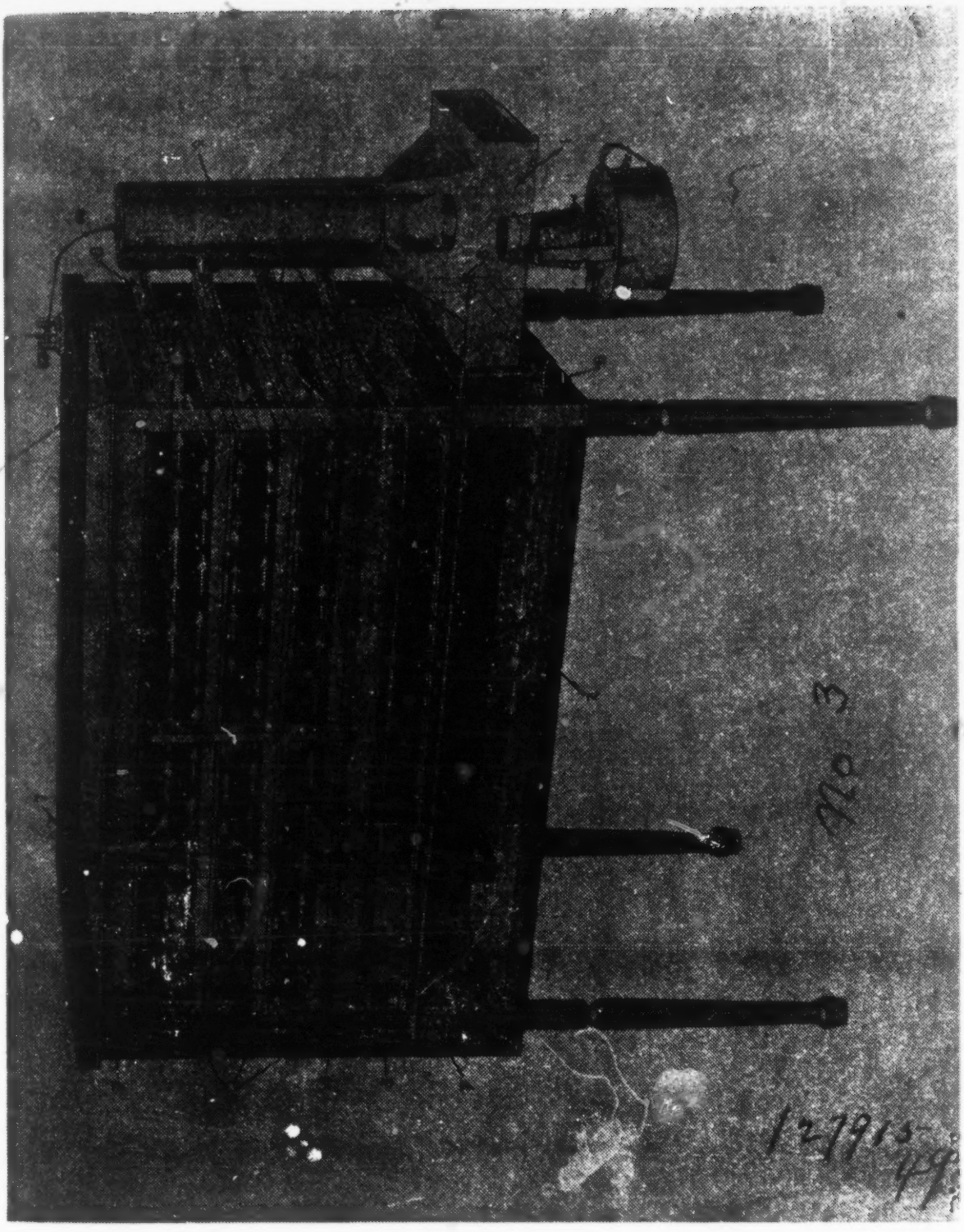
draft created at the outlets by variations of temperature as provided in the Koons' construction would in his opinion so exhaust the moisture as to destroy the hatch.

George Cooley

Sworn to and subscribed before me this 22nd day of February 1918.

H. W. MacKinnon
Notary Public.

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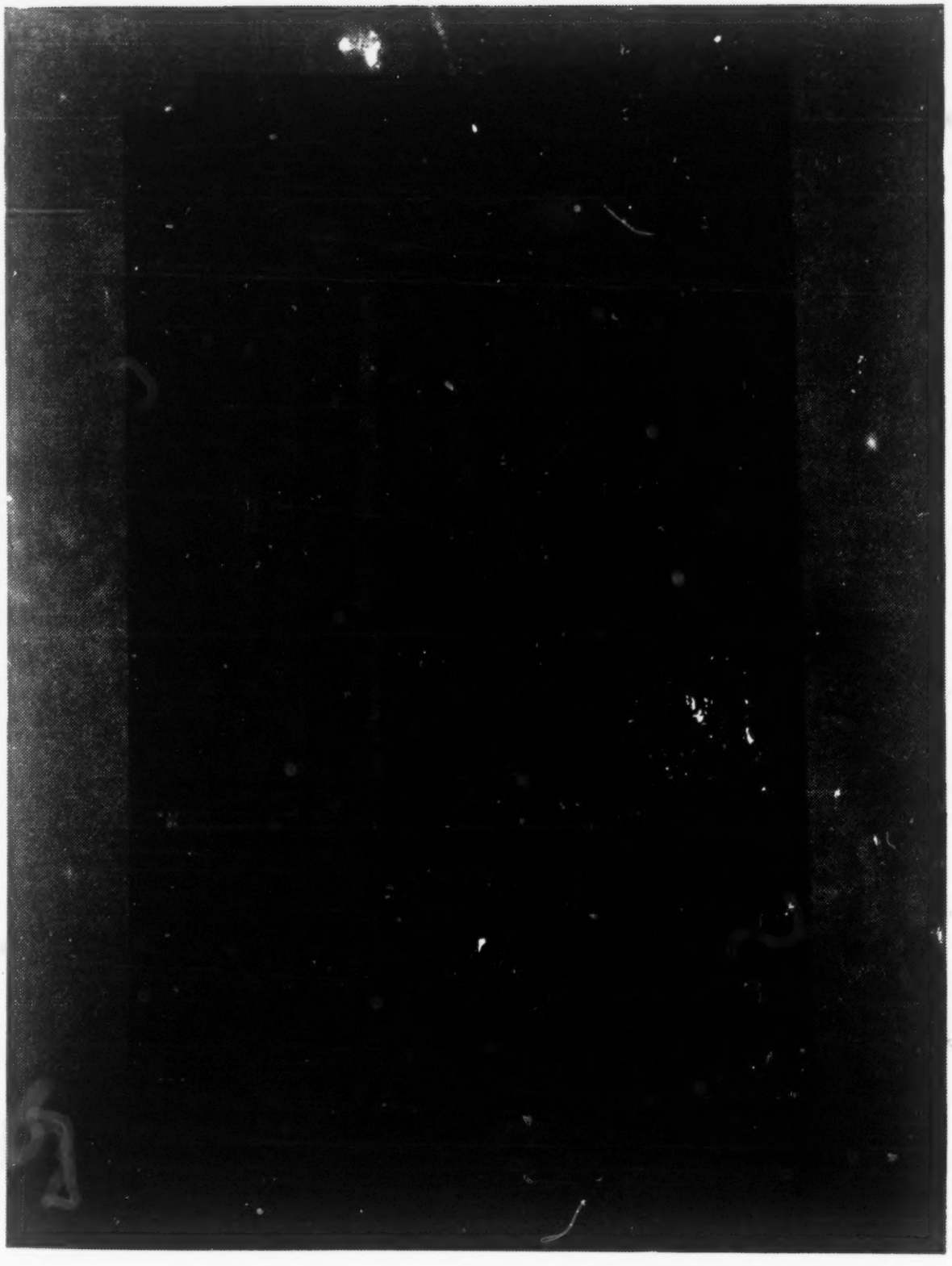
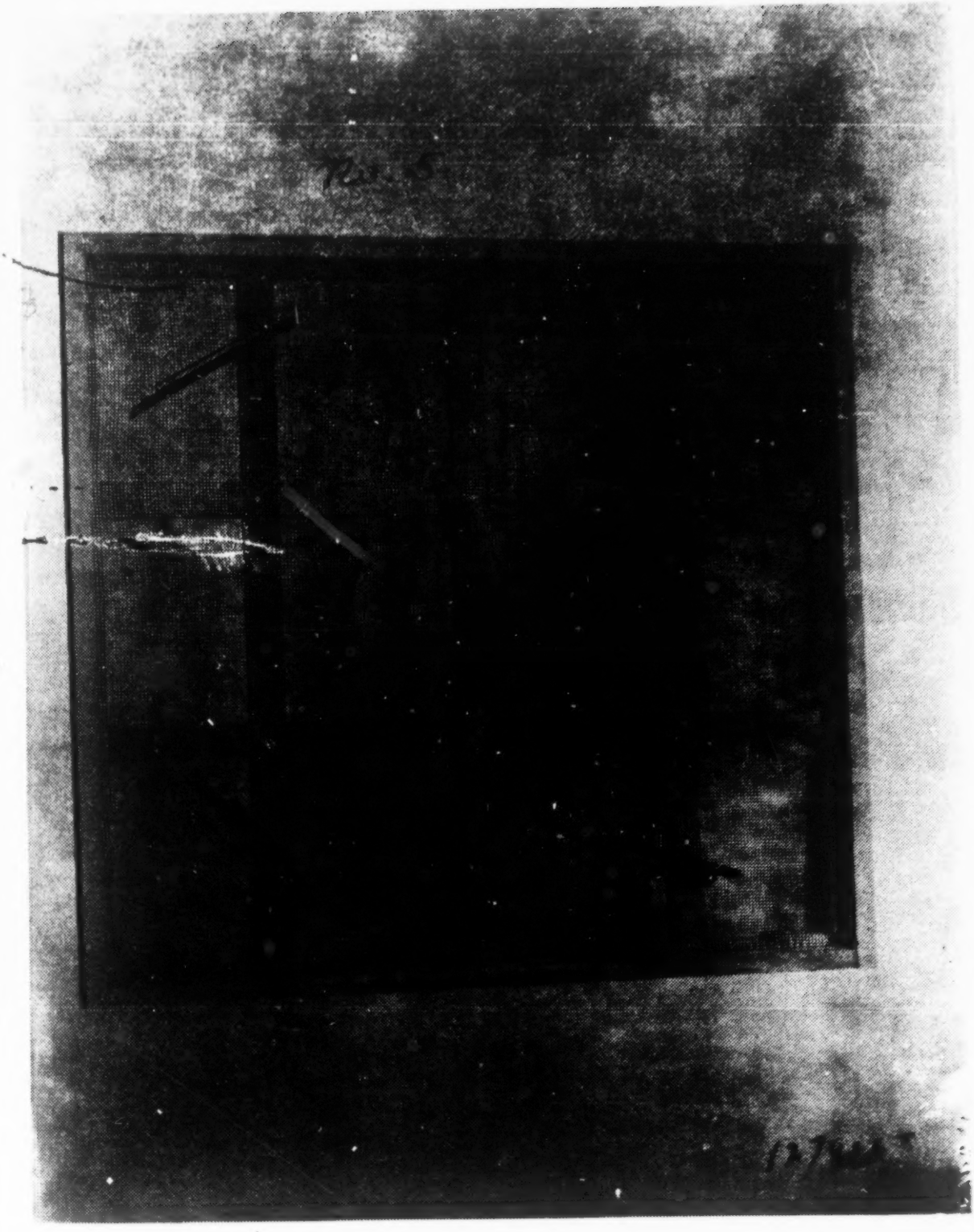
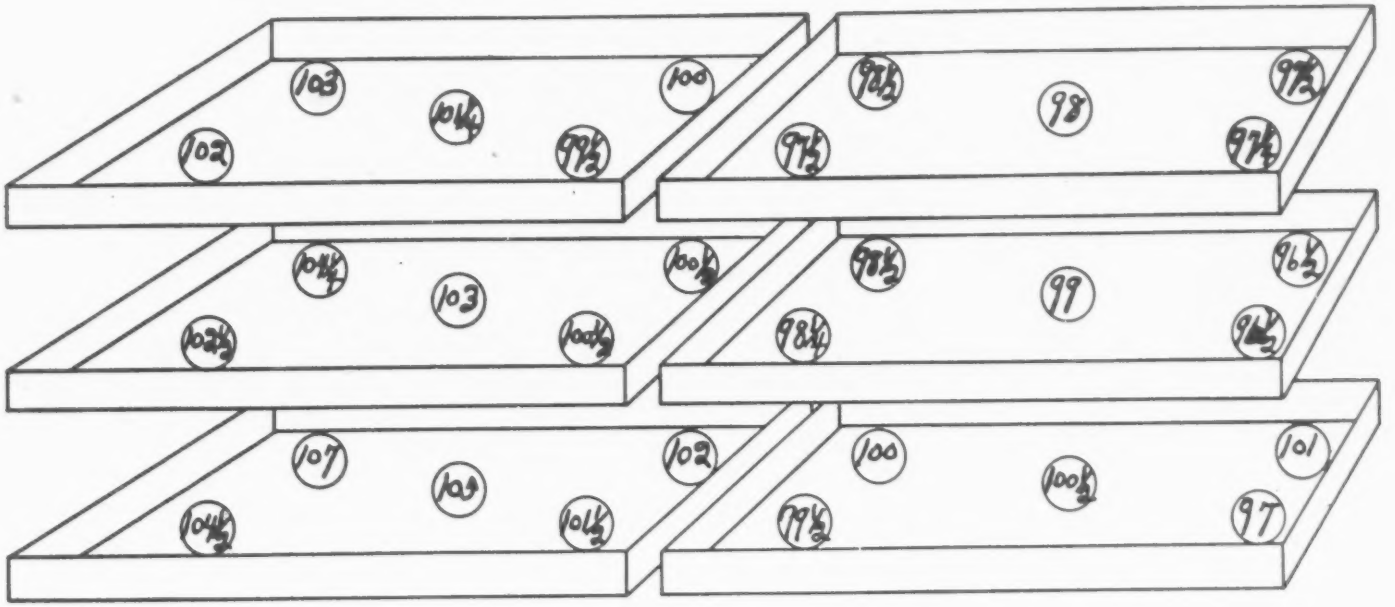




Sept. 21 – 1917
9 A. M.
Temp. of Room 72

"A"

U. C. 150 ova Incubator
3 trays – Tubes disconnected from stack



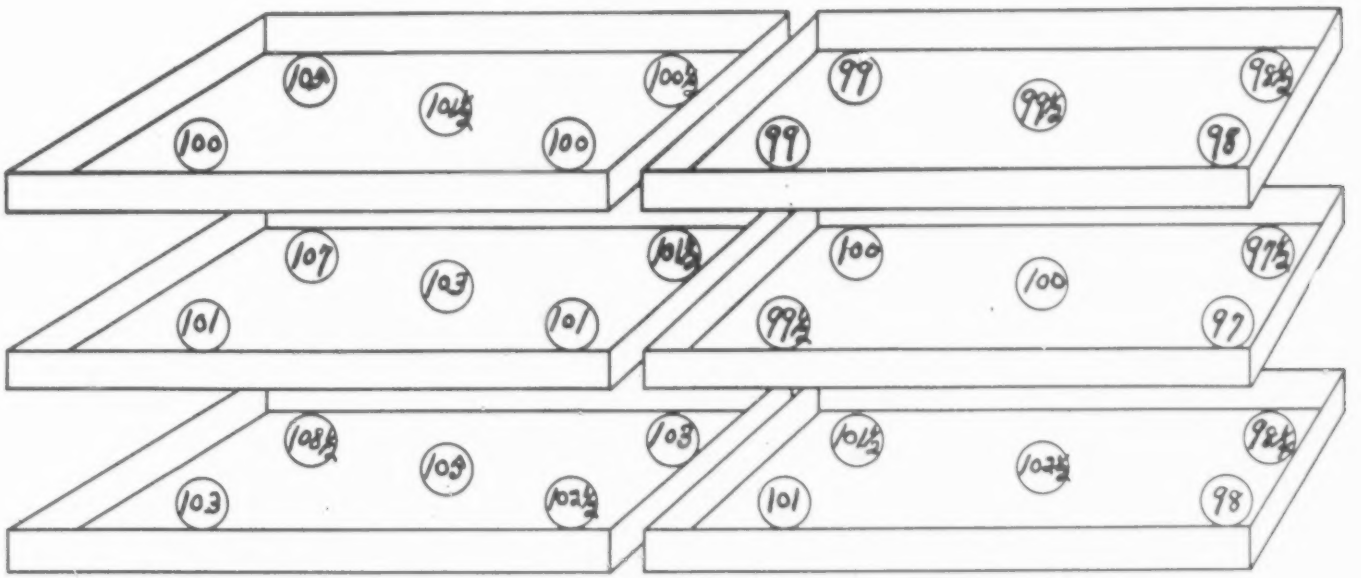
53

951

Sept. 27–1917
Temp. of Room 70°

"B"

U. C. Koons Incubator
3 trays = 4 draught tubes connected with stack.



54

Sept 29–1917
Temp. of Room 70°

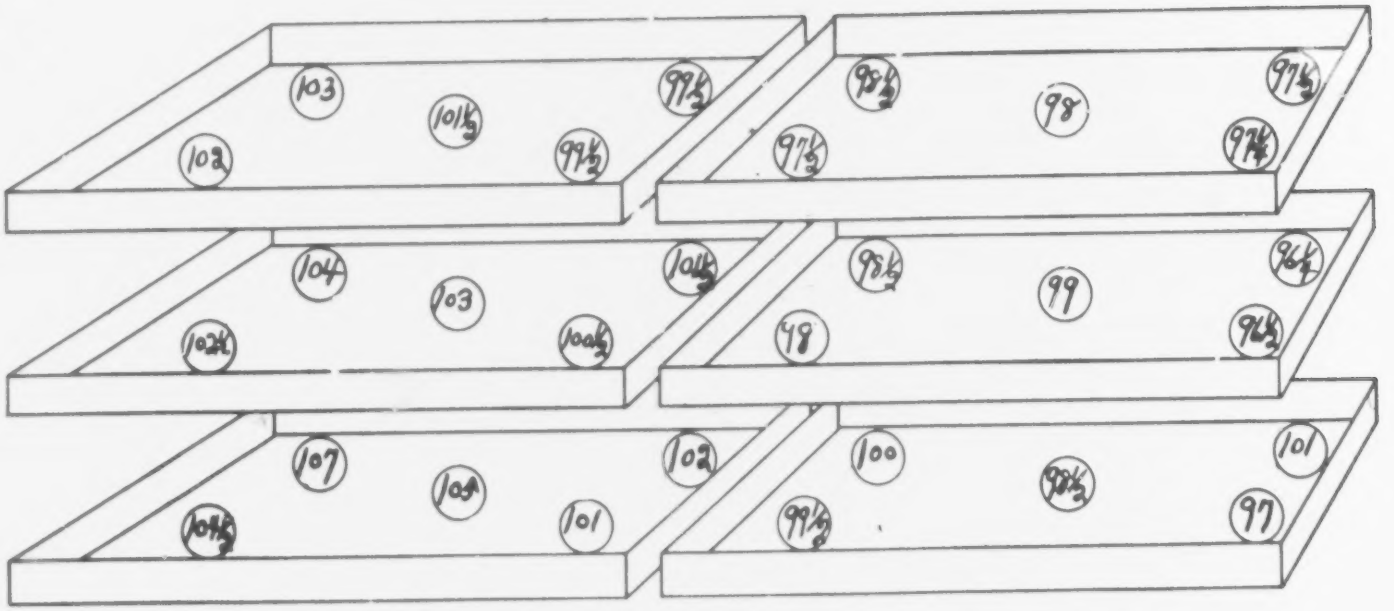
"C"

U. C. Kiln Succulator.
3 trays – 4 draught tubes connected with stack.

October 3–1917 "II"
Temp. of Room 70°

U. C. Iowa Incubator.
3 trays – 4 draught tubes connected with stack.

October 9—1917 "E" U. C. Koon's Incubator.
Temp of Room 70° 3 trays — draught tubes disconnected.



959

961

C

Div. 38 Room 378
Appn. No. 127315.
Filed Oct. 26, 1916.
Incubators.
Samuel D. Smith.

Commissioner of Patents,
Washington, D. C.

Sir: In the above entitled application please place the numeral 28 with proper lead lines on Figs. 1 and 3 of the drawings to indicate outlets as per enclosed blue print.

Respectfully.

Samuel B. Smith
By Staley & Bowman
Percy Norton

Springfield, Ohio

2 PRINT RETURNED
BY DRAFTING DIV.

ADDRESS ONLY
THE COMMISSIONER OF PATENTS,
WASHINGTON, D. C.

K.O'D.

Serial No. 127,915.

DEPARTMENT OF THE INTERIOR

UNITED STATES PATENT OFFICE

WASHINGTON March 12, 1918.

Samuel B. Smith, Assor.

Sir: Your APPLICATION for a patent for an IMPROVEMENT in Incubators,

filed Oct. 26, 1916, has been examined and ALLOWED.

The final fee, TWENTY DOLLARS, must be paid not later than SIX MONTHS from the date of this present notice of allowance. If the final fee be not paid within that period, the patent on this application will be withheld, unless renewed with an additional fee of $15, under the provisions of Section 4897, Revised Statutes.

The office delivers patents upon the day of their date, and on which their term begins to run. The printing, photolithographing, and engrossing of the several patent parts, preparatory to final signing and sealing, will require about four weeks, and such work will not be undertaken until after payment of the necessary fee.

When you send the final fee you will also send, DISTINCTLY AND PLAINLY WRITTEN, the name of the INVENTOR, TITLE OF INVENTION, AND SERIAL NUMBER AS ABOVE GIVEN, DATE OF ALLOWANCE (which is the date of this circular), DATE OF FILING, and, if assigned, the NAMES OF THE ASSIGNEES.

If you desire to have the patent issue to ASSIGNEES, an assignment containing a REQUEST to that effect, together with the FEE for recording the same, must be filed in this office on or before the date of payment of final fee.

After issue of the patent uncertified copies of the drawings and specifications may be purchased at the price of FIVE CENTS EACH. The money should accompany the order. Postage stamps will not be received.

Final fees will NOT be received from other than the applicant, his assignee or attorney, or a party in interest as shown by the records of the Patent Office.

Respectfully,

Jas. Newton
Thos. Ewing
Commissioner of Patents.

UNCERTIFIED CHECKS WILL NOT BE ACCEPTED.

LAW OFFICES
STALEY BOWMAN
PATENT SOLICITORS
WASHINGTON, D. C.

MAR 18 1918

March 16th, 1918.

Commissioner of Patents,

Sir:-

We hand you herewith check for $20.00 in payment of the final government fee on the application of

Samuel B. Smith
Ser. No. 127,915
Filed October 26th, 1916
INCUBATORS
Allowed March 12th, 1918
Patent to issue to
The Buckeye Incubator Company.

Respectfully,
STALEY & BOWMAN

CIW/AB

1916

CONTENTS:

1262860

1. Application 1 papers O.K.
2. Rejection NOV 1 1918 ✓
3. Amendment A MAR 6-1917 ✓
4. Rejection MAR 24 1917 ✓
5. Amendment B APR 7-1917 ✓
6. Rejection APR 12 1917 ✓
7. Amendment C APR-23 1917 ✓
8. Rejection MAY 3 1917 ✓
9. Asse Power of Atty JUN 21 1917
10. Amendment D JUN 28 1917
11. Rejection JUN 30 1917 ✓
Offsample Amendment E & Exhibits Feb 26 1918
13(a). Notice of Suit June 7-1926
13. Notice of Suit 4/17/22
14. Notice of Suit, July 16-23
15. 2 Notices of suit, Dec 27, 1923
16. Notice of Suit Nov. 10-1923
17(a). Oct. 17-1924
17. Notice of Suit, Mar. 13-1924
18(a). Sept. 19-1925
18. Notice of Suit June 17-1924
19(a). Sept. 19-1925
19. Notice of Suit, July 14-1924
20. Notice of Suit Aug 21-1924
21. Notice of Suit Sept. 5-1924
22(a+b). Aug. 28-1926
22. Notice of Suit Sept. 28-1924
23. Notice of Suit Oct. 4-1924
26. Notice of Suit Dec. 19-1924
27. Notice of Suit Feb. 13-1925
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29. Notice of Suit Aug. 18-1925
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31. Notice of Suit May 26-1926
32. Notice of Suit June 9-1926
33(a). Mar. 7-1927
33. Notice of Suit July 17-1926
34. Notice of Suit July 19-1926
35. Notice of Suit Dec. 29-1926
36. Notice of C.C. of Appeals Feb. 15-1927
37. Notice of C.C. of Appeals June 10-1927
38. Notice of Suit June 25-1927
39. Notice of Suit June 25-1927
40(a). July 25-1927
40. Notice of Suit July 5-1927
41(a). Sept. 3-1927
41. Notice of Suit July 25-1927
42. Notice of Suit Aug. 1-1927
43. Notice of Suit Aug. 5-1927
44. Notice of Suit Nov. 28-1927
45. Notice of Suit Mar. 31-1928
46. Notice of Suit Mar. 31-1928
47. Notice of Suit April 6-1928

1262860

1. Application ..... 1 papers O.K.
2. Rejection ..... NOV 1 1918
3. Amendment A ..... MAR 6 1917
4. Rejection ..... MAR 24 1917
5. Amendment B ..... APR 7 1917
6. Rejection ..... APR 12 1917
7. Amendment C ..... APR 23 1917
8. Rejection ..... MAY 3 1917
9. Asse Power of Atty ..... JUN 21 1917
10. Amendment D ..... JUN 28 1917
11. Rejection ..... JUN 30 1917
- Substitute Amendment E & Exhibits ..... Feb 26 1918
13(a). Notice of Suit ..... June 7-1926 4/17/22
14. Notice of Suit ..... July 16 - 23
15. 2 Notices of suit, Dec 27, 1923
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41(a). Sept. 3-1927
41. Notice of Suit ..... July 25-1927
42. Notice of Suit ..... Aug. 1-1927
43. Notice of Suit ..... Aug. 5-1927
44. Notice of Suit ..... Nov. 28-1927
45. Notice of Suit ..... Mar. 31-1928
46. Notice of Suit ..... Mar. 31-1928
47. Notice of Suit ..... April 6-1928
48. Notice of C.C.A. April 24-1928
49. Notice of Suit ..... April 6-1928
50. Notice of Suit ..... April 23-1928

121915 [See other side for continuation]

151

J B Smith
Pat. 1262.860

CD Huntington	119-30 35 to 42 dom to 44	Oct 31, 1916
CDH	asked in domain 19 32 36	Mar 24, 1917
CDH	none	Apr 30 -

51. Notice of Suit April 25-1928
52. Notice of C.C.A. April 28-1928
53. Notice of Suit June 4-1928
54. Notice of Suit June 4-1928
55. Notice of C.C.A. July 6-1928
56. Paper # 56 Date: 7, 1929
57 Paper # 57, Apr. 23, 1929
58 Notice of Suit May 6, 1929
59 Notice of Suit May 11, 1929
60. Notice of Suit July 29-1929
61. Notice of Suit Sept. 9-1929
62. Notice of Suit Sept 9-1929
63 Notice of C.C. Appeal Sept. 12-1929
64. Notice of Suit Nov. 20-1929
65. Notice of Suit Nov. 27-1929
66. Notice of Suit May 13-1930
67 Notice of Suit May 13-1930
68. Notice of C.C. Appeal May 24 1930
69. Notice of C.C. Appeal Feb. 13-1931
70 Notice of Suit [illegible] 30-1931

75. Notice of Suit July 11-1932
76. Notice of Suit Sept. 23-1932
77. Notice of Suit Feb. 23-1933
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80 Notice of Suit May 3-1933
81 Notice of Suit May 3 1933
82. Notice of [illegible] June 3-1933
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CDHuntington 119-30 35 to 42 Edmonton Oct 31, 1916
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CDH asked in dwgs 19 32 36 Mar 24, 1917

CDH none Apr 30 -.

51. Notice of Suit April 25-1928
52. Notice of C.C.A. April 28-1928
53. Notice of Suit June 4-1928
54. Notice of Suit June 4-1928
55. Notice of C.C.A. July 6-1928
56. Paper # 56 Jan. 7, 1929
57 Paper # 57, Apr. 23, 1929
58 Notice of Suit, May 6, 1929
59 Notice of Suit May 11, 1929
60. Notice of Suit July 29-1929
61. Notice of Suit Sept. 9-1929
62. Notice of Suit Sept 9-1929
63 Notice of C.C. Appeal Sept. 12-1929
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74 Notice of Suit June 13-1932

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78. Notice of Suit Mar 17, 1933
79. Notice of Suit April 17-1933
80 Notice of Suit May 3-1933
81. Notice of Suit May 3 1933
82. Notice of Appeal June 3-1933
83
84.

S. B. SMITH.

INCUBATOR.

APPLICATION FILED OCT. 26, 1916.

1,262,860.

Patented Apr. 16, 1918.

2 SHEETS—SHEET 2.

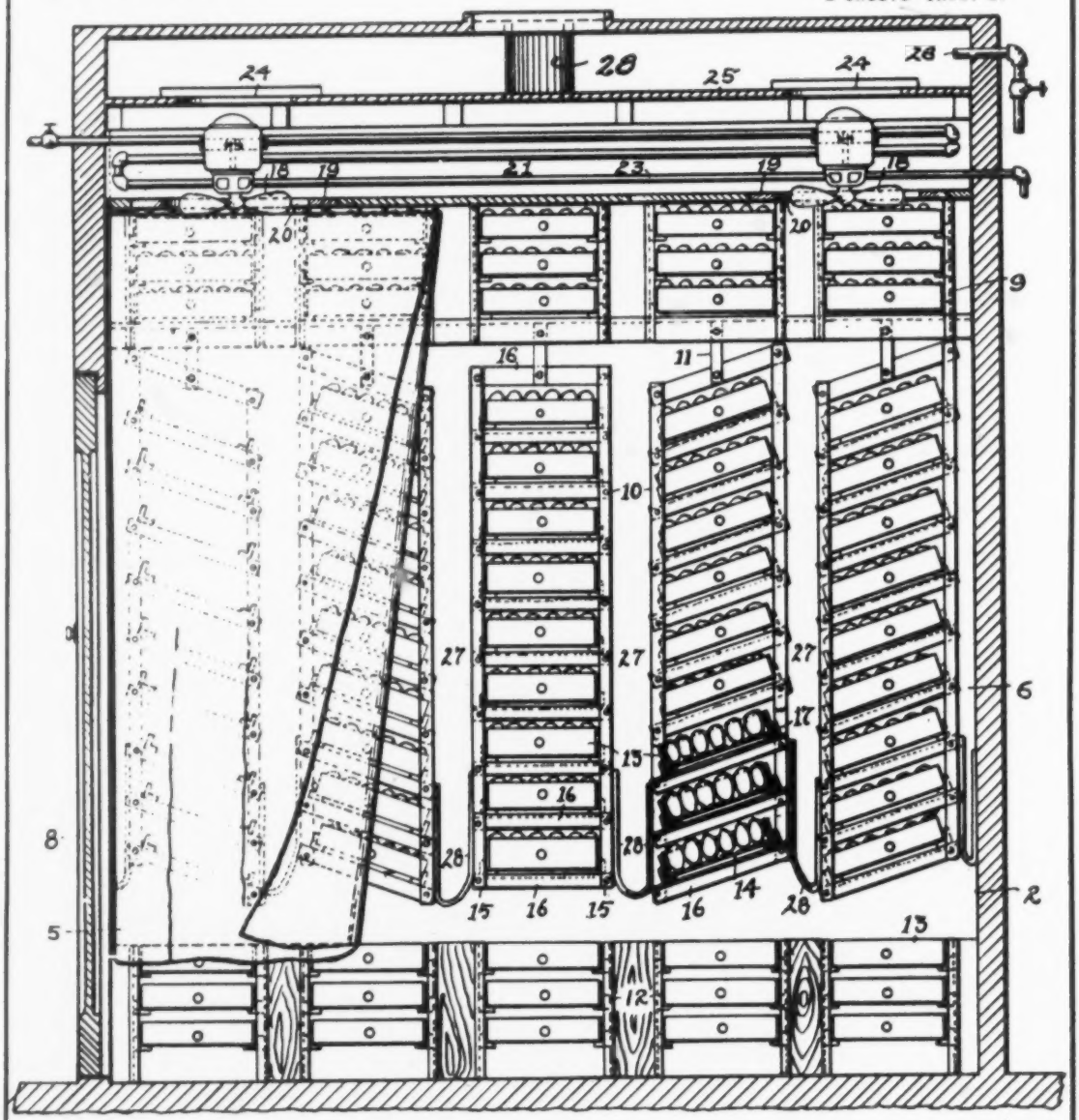

FIG. 3

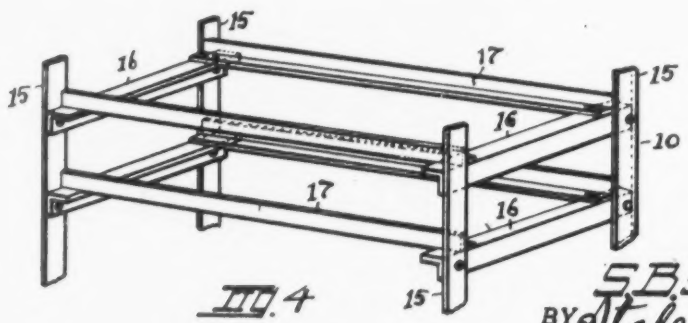

FIG. 4

INVENTOR.

S. B. SMITH.

BY Staley & Bowman

ATTORNEYS.

35

S. B. SMITH.

INCUBATOR.

APPLICATION FILED OCT. 26, 1916.

1,262,860.

Patented Apr. 16, 1918.

2 SHEETS—SHEET 1.

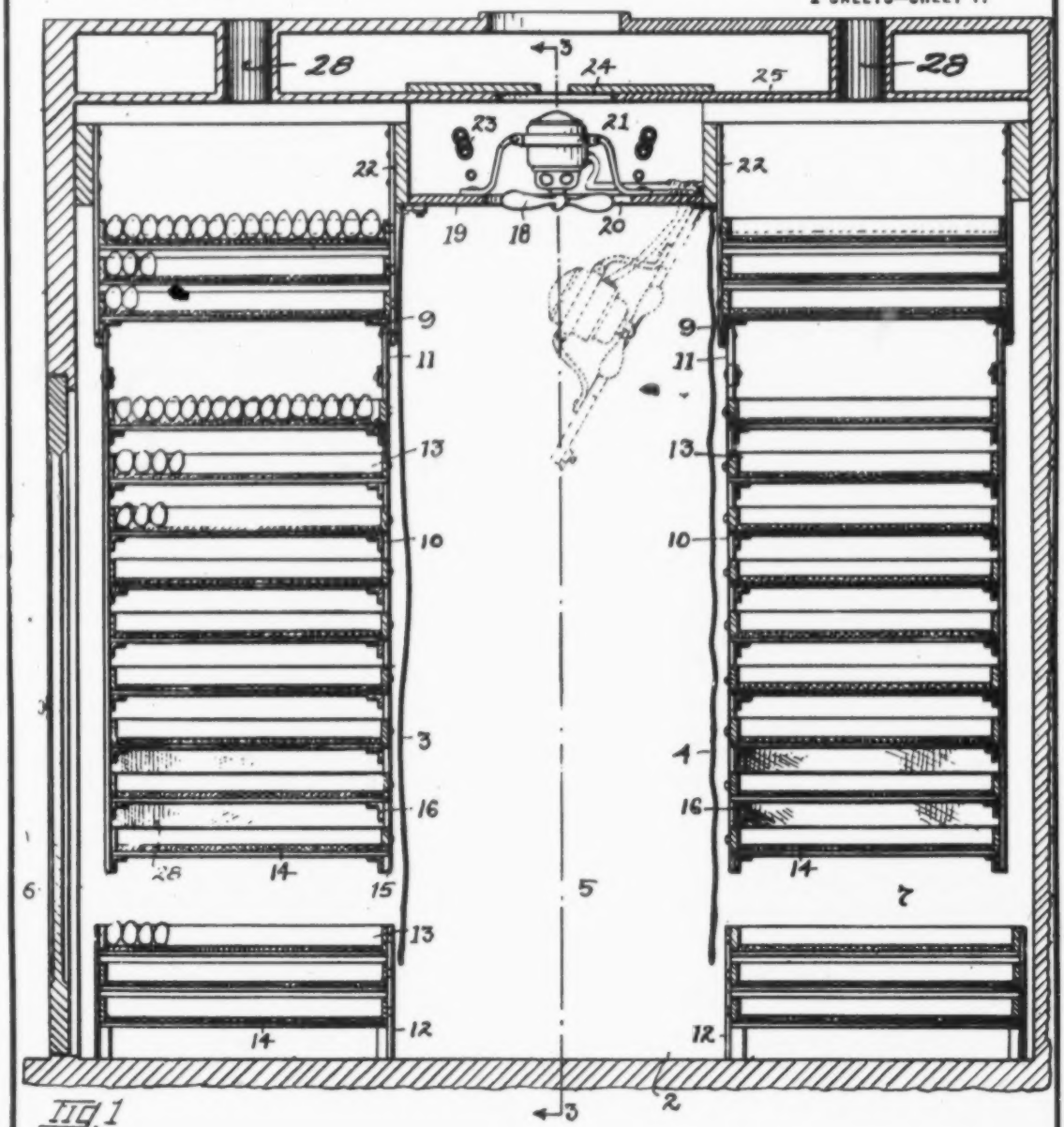

Fig. 1

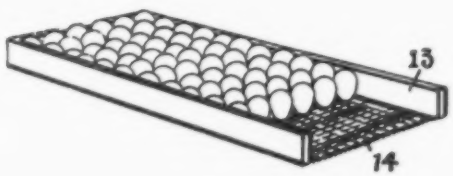

Fig. 2

INVENTOR.

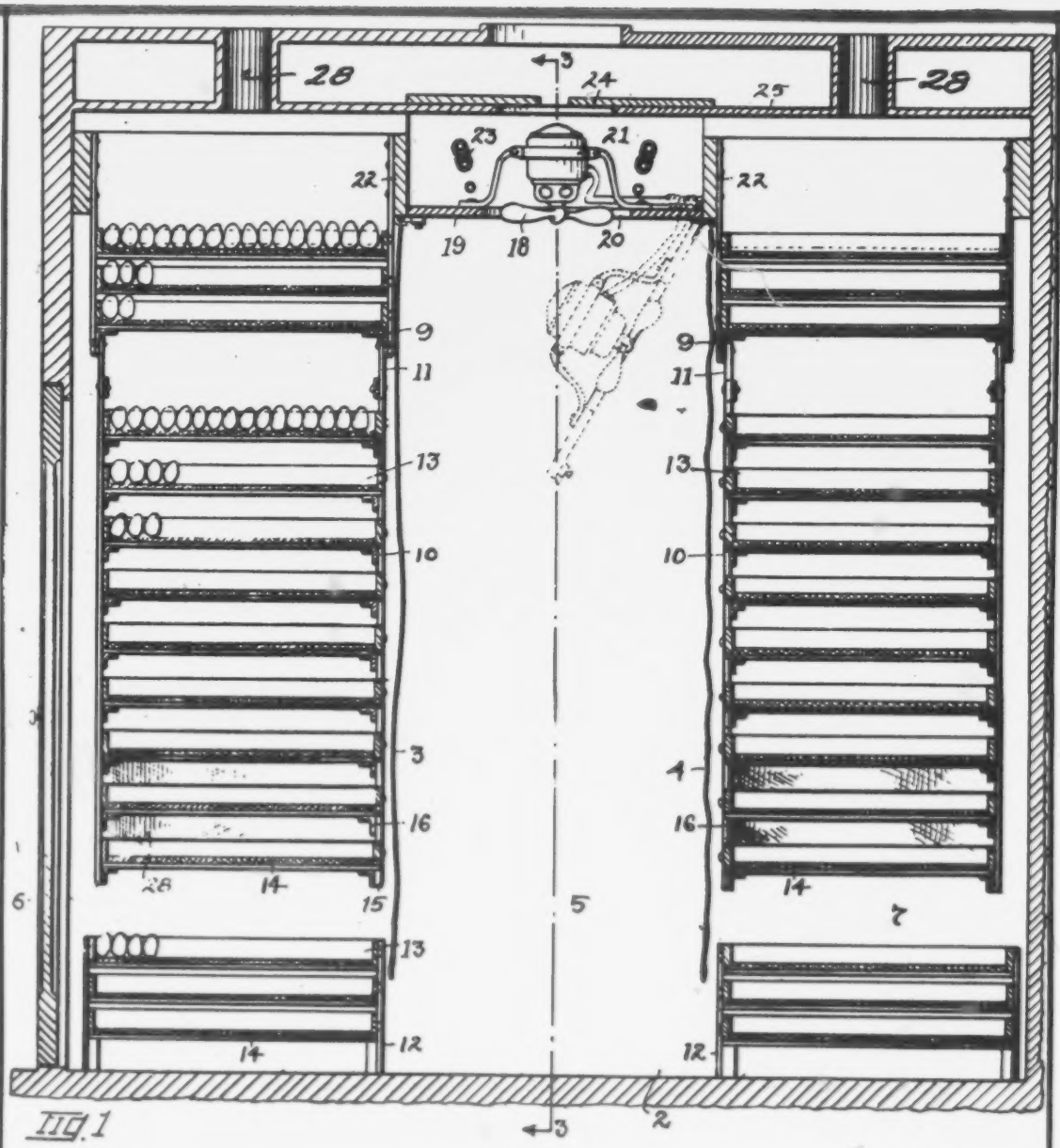

Fig. 1

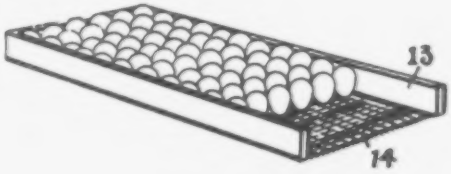

Fig. 2

INVENTOR.
S.D. SMITH.
BY Staley & Bowman
ATTORNEYS.

Allowed March 8, 1918

UNITED STATES PATENT OFFICE.

SAMUEL B. SMITH, OF CLEVELAND, OHIO, ASSIGNOR TO THE BUCKEYE INCUBATOR CO., OF SPRINGFIELD, OHIO, A CORPORATION OF OHIO.

INCUBATOR.

1,262,860. Specification of Letters Patent. Patented Apr. 16, 1918.

Application filed October 26, 1916. Serial No. 127,915.

To all whom it may concern:

Be it known that I, SAMUEL B. SMITH, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Incubators, of which the following is a specification.

The improved apparatus and method, is particularly designed for extensive operations wherein a chamber of large dimensions is adapted to contain thousands of eggs in separate trays arranged in tiers and the method of heating is such that the heated air is adapted to the eggs in various stages of incubation. There is a forced circulation of hot air through the chamber which is adapted preferably to maintain all eggs at temperatures between 100° and 105° Fahrenheit approximately and this improved system contemplates that fresh eggs will be placed in a horizontal plane, preferably by means of trays supported in horizontal planes, and after the eggs have been subject to the circulation of hot air for a predetermined time (the air circulating largely around the eggs) they will be placed in a tilted or inclined position in a different location but still subject to the same column of air and at this period of incubation they will be tilted in different planes at regular intervals during the time they remain in this latter position, and after they have remained for a predetermined time they will be again moved to a different position with reference to the forced circulation of hot air and so placed therein that the air will tend to keep the eggs below 105° temperature, and in this last named position the air will be forced to pass between the different eggs and will in effect act as a cooling medium for the eggs. The temperature of circulating air should be such as will prevent the eggs in the early stage of incubation from falling below 100° and the speed or velocity of the circulating air should be such as to carry the heat away from the eggs in the later stage of incubation and thereby hold the temperature of those eggs at 105° or slightly below that. It is manifest that the temperature will remain practically the same throughout the column of eggs, but the air is impelled with sufficient velocity to carry the heat away from the eggs which happen to be in the advanced stage of incubation.

In the accompanying drawings:

Figure 1 is a cross section of my improved incubator.

Fig. 2 is a perspective view of one of the egg trays with one end removed to more clearly disclose the open mesh bottom.

Fig. 3 is a vertical section of the incubator on line 3—3, Fig. 1.

Fig. 4 is a perspective view of a portion of one of the tilting racks for the trays.

The invention comprises a walled chamber 2 corresponding in size to that of an ordinary room, say approximately nine feet high, eight to ten feet wide, and of any desired length, and this chamber is subdivided longitudinally by two parallel rows of curtains 3 and 4 to provide a central compartment or corridor 5 and side compartments 6 and 7. Entrance to the corridor is gained by a door 8, and the compartments behind the curtains contain elevated stationary racks 9 which are within convenient reach of the attendant for introducing the fresh supply and from which elevated position the trays may be shifted at the proper time to a tier of tilting racks 10 on a lower plane and suspended therefrom by links 11. A series of stationary racks 12 are also arranged beneath the tilting racks 10, and all of said racks are of open construction and of the same size to permit interchange of the shallow trays 13 for the eggs to be hatched. These trays are provided with open mesh bottoms 14 upon which the smaller ends of the eggs rest in close and solid formation and each tray of eggs occupies the upper rack 9 for the first three days, and is then transferred to a place in the upper end of the tilting rack 10. During the next fifteen days the trays in the tilting rack are shifted from higher to lower planes therein and tilted at frequent intervals to stand in oppositely-inclined positions. The tilting of the eggs is preferably arranged to put the eggs substantially on their sides. When the eggs in the lower-most trays in the tilting racks 10 are about ready to hatch each tray is transferred to the stationary rack 12 where the chicks may be removed as occasion requires.

Each tilting rack 10 comprises perpendicular corner bars 15 pivotally united by a series of cross bars 16 carrying connecting angle irons 17 extending from front to rear

at each side and upon which the trays are adapted to be slidably supported. The links 11 are pivotally connected at the center of the uppermost cross bars 16 of each tilting rack, thus permitting an entire series of trays to be placed in an inclined position by merely raising or lowering one side of the rack by hand engagement. The weight and friction and balance of the parts cause the trays to remain in any shifted position, whether horizontal or inclined. The fans or series of fans 18 mounted upon the hinged trap doors 19 forming the ceiling of the central corridor 5 constitute the means for forcing the hot air through the chamber and there are circular openings 20 provided in said doors within which the fans are arranged properly. The longitudinal space 21 above the fans has open communication above the side walls 22 with the upper ends of the rack compartments behind the curtains 3 and 4 and these curtains extend a sufficient distance, as indicated in Fig. 1, to cause the heated air distributed by the fans to pass downwardly through the central corridor to a point near the bottom of the chamber where it can pass into the space occupied by the trays. As explained later the trays near the bottom are preferably arranged so that the air is forced to pass between the eggs in each tray thereby cooling or holding the temperature of those eggs down. Thence the air passes into spaces above the lower series of trays until it reaches the distributing space 21 above the fan. Coils of heating pipe 23 are arranged in the space 21 to heat the air and more or less fresh air may be taken in through the valved opening 24 above the space 21 and this fresh supply of air may be charged with steam to a greater or less degree by means of a valve controlled jet or pipe 26 see Fig. 3. The outlets 28 for the release of foul air are made of such restricted capacity as to prevent the undue escape of moisture. It is possible to limit the openings and so conserve the moisture by reason of the vitalizing effect of the power driven current upon the body of the air within the chamber. By lowering the hinged trap doors, the motor and fan are also easily reached for inspection, etc.

In Fig. 3 only a single curtain 3 is shown in place, the curtain or curtains at the right being entirely removed to disclose the racks and trays in full lines, and it will be also noted that the vertical spaces 27 between the adjacent tilting racks 10 are closed at their lower ends by flexible strips of fabric which are attached to and extend upward at each side of each rack so as to compel the air to circulate through the mesh bottom and around and about each egg as heretofore referred to, and as the eggs further advanced in incubation are contained in these lower trays and as the danger is that the temperature will rise in these eggs to a point injurious to incubation the improved method disclosed herein permits the circulating air to act as a medium to prevent the over heating at this stage of incubation and this is accomplished by promoting an induced draft within the lower trays. It is obvious that the fans can be so arranged and can be operated at such speed as to cause the hot air to circulate fast enough to keep the temperature throughout the chamber between the limits of 100° and 105°.

It, therefore, appears that the improved apparatus and method contemplates the application of hot air circulating in a column with such speed as to keep the temperature substantially uniform and so arranging the eggs that the fresh eggs are placed at one point in the column of air and held in a horizontal plane until they reach a predetermined stage of incubation and then put at a different point in the same column of air and kept in planes inclined to the horizontal and thereafter placed at such a point in the column of air that the forced draft of air acts to hold the eggs at a uniform temperature and to prevent them from becoming overheated and thereafter placing the eggs into final position for the hatching operation.

Any suitable thermostatic means may be employed for regulating the temperature, such for instance as a thermostat commonly employed in incubators of a well-known construction and illustrated in Letters-Patent No. 1,111,138, dated September 22nd, 1914, which thermostat may be suitably connected to the valve controlling the steam or hot water, as the case may be, which passes through the pipes 23.

Having thus described my invention, I claim:—

1. The method of hatching a plurality of eggs by arranging them at different levels in a closed chamber having restricted openings of sufficient capacity for the escape of foul air without undue loss of moisture and applying a current of heated air, said current being created by means other than variations of temperature and of sufficient velocity to circulate, diffuse and maintain the air throughout the chamber at substantially the same temperature, whereby the air will be vitalized, the moisture conserved and the units of heat will be carried from the eggs in the more advanced stage of incubation to those in a less advanced stage for the purpose specified.

2. The method of hatching a plurality of eggs by arranging them at different levels in a closed chamber having restricted openings of sufficient capacity for the escape of foul air without undue loss of moisture and applying a power driven current of heated

air in an adjacent chamber through openings into the egg chamber, said current being of sufficient velocity to circulate, diffuse and maintain the air throughout the egg chamber at substantially the same temperature, whereby the air will be vitalized, the moisture conserved and the units of heat will be carried from the eggs in the more advanced stage of incubation to those in a less advanced stage for the purpose specified.

3. The method of hatching a plurality of eggs by arranging them at different levels in a closed chamber having restricted openings of sufficient capacity for the escape of foul air without undue loss of moisture and applying a vertically directed current of heated air in an adjacent chamber to circulate in said egg chamber through upper and lower openings between said chambers, said current being created by mechanically moving means of such velocity as to diffuse and maintain the air throughout the egg chamber at substantially the same temperature whereby the air will be vitalized, the moisture conserved and the units of heat will be carried from the eggs in the more advanced stage of incubation to those in the less advanced stage for the purpose specified.

4. In an incubator, a closed chamber having a central corridor provided with an air-distributing space in its upper portion and a power-driven fan in said space, curtains at each side of said corridor, arranged to permit the air to circulate from the bottom of the chamber into the part of the chamber behind the curtains, passageways connecting the air distributing space with the corridor and the parts of said chamber behind the curtains, separate stationary and tilting racks behind said curtains, egg-trays having open-mesh bottoms removably mounted upon said racks, and means to heat the air circulated through said chamber.

5. In an incubator, a closed chamber with a vertically disposed partition to provide a corridor having upper and lower passage ways to said chamber, egg trays arranged at different levels in said chamber, a power driven fan creating a current in said corridor to circulate through said passage ways and egg trays, said chamber having restricted openings of sufficient capacity for the discharge of foul air without undue loss of moisture and means to heat the air circulated through said chamber.

In testimony whereof, I have hereunto set my hand this 20th day of October, 1916.

SAMUEL B. SMITH.

Witnesses:

HANNAH D. PLAIN,

IDA M. SMITH.

70 (Certificate of Clerk to Stipulation.)

United States of America,
Fourth Div. District of Minnesota—ss.

I, Joel M. Dickey, Clerk of the United States District Court in and for the District of Minnesota, do hereby certify that the anexed and foregoing is a true and full copy of the original and of the endorsements thereon, now remaining among the records of the said Court in my office.

Seal
U. S. Dist. Court,
Dist of Minnesota,
Fourth Division.

In Testimony Whereof, I have hereunto subscribed my name and affixed the seal of the aforesaid Court at Minneapolis, this 15th day of June, A. D. 1933.

JOEL M. DICKEY, Clerk,
By Thomas H. Howard, Deputy Clerk.

Filed Jun. 17, 1933. E. E. Koch, Clerk.

982 And thereafter the following proceedings were had in said cause in the Circuit Court of Appeals, viz.:

(Appearance of Mr. Ralph E. Williamson as Counsel for Appellants.)

United States Circuit Court of Appeals
Eighth Circuit.

E. H. Snow, et al., Appellants,
No. 9757. vs.
Samuel B. Smith.

The Clerk will enter my appearance as Counsel for the Appellants.

RALPH E. WILLIAMSON.

(Endorsed): Filed in U. S. Circuit Court of Appeals, Dec. 14, 1933.

(Appearance of Mr. James F. Williamson as Counsel for Appellants.)

Hon. E. E. Koch, Clerk of the
Above Entitled Court,
Federal Building,
St. Louis, Missouri.

Sir:

You will please enter our appearance on behalf of the defendant-appellant in the above entitled case.

Signed at Minneapolis, Minnesota, this 26th day of May, 1933.

WILLIAMSON & WILLIAMSON,
JAMES F. WILLIAMSON,
925 Metropolitan Life Building,
Minneapolis, Minnesota.

983 (Endorsed): Filed in U. S. Circuit Court of Appeals, May 29, 1933.

(Appearance of Mr. A. L. Ely as Counsel for Appellee.)

The Clerk will enter my appearance as Counsel for the Appellee.

A. L. ELY,
Leader Bldg.,
Cleveland, O.

(Endorsed): Filed in U. S. Circuit Court of Appeals, Jun. 7, 1933.

(Appearance of Mr. A. C. Paul as Counsel for Appellee.)

The Clerk will enter my appearance as Counsel for the Appellee.

A. C. PAUL.

(Endorsed): Filed in U. S. Circuit Court of Appeals, Jul. 19, 1933.

(Appearance of Mr. Maurice M. Moore as Counsel for Appellee.)

The Clerk will enter my appearance as Counsel for the Appellee.

MAURICE M. MOORE,
710 Security Building.

(Endorsed): Filed in U. S. Circuit Court of Appeals, Dec. 13, 1933.

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984 (Order of Argument.)

November Term, 1933.
Wednesday, December 13, 1933.

This cause having been called for hearing in its regular order, argument was commenced by Mr. James F. Williamson and continued by Mr. Ralph E. Williamson for appellant, and the hour for adjournment having arrived further argument was postponed until tomorrow morning.

(Order of Submission.)

November Term, 1933.
Thursday, December 14, 1933.

This cause having been called for further hearing, argument was continued by Mr. A. L. Ely for appellee and concluded by Mr. Ralph E. Williamson for appellants.

Thereupon, this cause was submitted to the Court on the transcript of the record from said District Court and the briefs of counsel filed herein.

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985 (Opinion.)

United States Circuit Court of Appeals
Eighth Circuit.

No. 9757.—MARCH TERM, A. D. 1934

E. H. Snow, and E. H. Snow doing business as Snow's Hatcheries and Snow's Incubator Company,
Appellants,
vs.
Samuel B. Smith,
Appellee.

Appeal from the District Court of the United States for the District of Minnesota.

Mr. James F. Williamson and Mr. Ralph E. Williamson for appellants.

Mr. Albert L. Ely (Mr. George C. McConnaughey and Messrs. Paul, Paul and Moore were with him on the brief), for appellee.

Before STONE and SANBORN, Circuit Judges, and WYMAN, District Judge.

STONE, Circuit Judge, delivered the opinion of the court.

This is an action for infringement of two method claims (claims 1 and 2) of Patent # 1,262,860, issued to Samuel B. Smith covering method and apparatus claims for an egg incubator. From a decree determining infringement, this appeal is brought by defendants. The issues here are invalidity of these claims and non-infringement, if valid.

I.

VALIDITY.

This patent has been frequently litigated. It has been held valid by every court which has passed upon that issue. This court so held in *Miller Hatcheries* v. *Buckeye Incubator Co.*, 41 Fed. [2d] 619, 620, wherein this Court not only accorded decisions in the Third and Sixth Circuits due comity but "independently examined

the question of validity". Obviously, that decision should control here unless it be clearly shown that important additional evidence bearing on invalidity is present here which was not before this court in the above case. Appellants contend that such evidence is here and rely upon an article in "Ure's Dictionary of Arts, Manufactures and Mines (Vol. II, pp. 652-653) and upon three patents, being #426,321 to Proctor and Knowles, #843,909 to Peters and Hungerford and #1,010,809 to Schmidt and Schutterle. The Dictionary article covers two distinct matters. The first describes two incubation systems both of which depend solely upon a maintenance of proper hatching temperature by heating a compartment with warm water. In one the water is in a circulatory system of pipes and the eggs are apparently placed in trays between the layers of pipes. There is no thought of air circulation. The second method is not described but has to do with the use of water from warm mineral springs. The three patents all have to do with air circulatory systems. The Proctor and Knowles patent is for a "drying-machine" designed to create a circulation of warm air throughout a room for the purpose of drying articles of any character placed or hung therein. Peters and Hungerford is for an "Atmosphere-regulating system" for maintenance of substantially uniform conditions of temperature, humidity and ventilation in a room. Schmidt and Schutterle is for an "Apparatus for drying Macaroni and like bakery products." Study of each and all of these references convinces that the problems they sought to solve are essentially different from those of incubation and that they are not so anticipatory of Smith as to render this patent invalid. We find in all of this evidence no reason to depart from the above conclusion that this patent is valid as announced by this Court in the Miller Hatcheries case, *supra*.

II.

INFRINGEMENT.

Determination of infringement depends largely upon the scope to be given the two above claims of the patent. The contentions as to the scope of these claims is best appreciated after a statement of the problem, the patent and the claims.

The patent and this controversy are comprehended only if certain basic facts which govern incubation are understood. These have to do with the proper development of the embryo of the egg into a chick, and of course, depend upon the features of such development existing naturally in the egg. During the twenty-one

days necessary for complete incubation, the problem requires consideration of the vital effects of temperature, moisture and ventilation. Temperature is involved because development of the embryo requires a temperature of about 100 degrees Fahrenheit and this requirement continues during the entire incubation period. The maintenance of this desirable temperature is complicated by the fact that the temperature disposition of the egg changes during incubation. During approximately the first half of the incubation period the egg is receptive of heat from a surrounding temperature of 100 degrees while during the last half it is giving off heat under such surrounding temperature. This change is fairly regular and is progressive. Because of this change in the temperature characteristic of the egg at different stages of incubation, it is obvious that temperature control—that is, maintenance of all eggs at all times at about 100 degrees—presents a different problem depending on whether the eggs in the incubator are all at the same stage or are at different stages of incubation. Smith addressed himself to the situation where the eggs were in all stages of incubation. His problem, therefore, was to supply about 100 degrees of heat to all eggs in the first half of the incubation period stages and to remove from those in the later stages any excess over 100 degrees—to maintain all eggs at about 100 degrees.

Moisture was another element of the problem because while eggs constantly give off moisture, the chick will be below normal if this evaporation takes place unduly. In short, it must be controlled and kept normal. Ventilation is important because the incubating eggs give off enough carbon-dioxide to be harmful if it is not released. Since Smith was concerned with eggs which were at all stages of incubation, these features of moisture and ventilation were constantly present. His entire problem was to maintain a temperature for all eggs of about 100 degrees with provisions for maintaining the proper moisture conditions and for sufficiently purifying the air of the carbon-dioxide.

The subject of the invention is an improved apparatus and method in incubators and is "particularly designed for extensive operations wherein a chamber of large dimensions is adapted to contain thousands of eggs in separate trays arranged in tiers." (p. 1, 11. 9-12). The basic purpose of the method is that ""the heated air is adapted to the eggs in various stages of incubation" (p. 1, 11. 13-15). The air is so "adapted" if *all* of the eggs can be maintained at "temperatures between 100 degrees and 105 degrees Fahrenheit approximately" (p. 1, 11. 17-19).

The main principles of the method are two: First, a forced circulation of the heated air and, second, the positioning of the eggs at different stages of incubation. The circulation is to be such as to be "largely around the eggs" (p. 1, l. 25) in the earlier stages of incubation and "between the different eggs" (p. 1, l. 39) at the advanced stages so that, during these advanced stages, it "will in effect act as a cooling medium for the eggs" (p. 1, ll. 39-40). The temperature of this circulating air is to be such "as will prevent the eggs in the early stage of incubation from falling below 100 degrees" (p. 1, ll. 42-43) and the speed or velocity of the circulation is to be such "as to carry the heat away from the eggs in the later stage of incubation and thereby hold the temperature of those eggs at 105 degrees or slightly below that" (p. 1, ll. 45-48). By this action, "the temperature will remain practically the same throughout the column of eggs, but the air is impelled with sufficient velocity to carry the heat away from the eggs which happen to be in the advanced stage of incubation" (p. 1, ll. 49-55). The positioning of the eggs primarily involves the "location" of the trays. There are three of these "locations". The first is that of trays containing the fresh eggs. After being in this location for "a predetermined time" (p. 1, l. 24), they are removed to "a different location but still subject to the same column of air" (p. 1, ll. 27-28). After remaining in this second location for "a predetermined time" (p. 1, ll. 32-33) they are "again moved to a different position with reference to the forced circulation of hot air and so placed therein that the air will tend to keep the eggs below 105 degrees temperature" (p. 1, ll. 33-37). The description of method just taken from the early part of the specifications is summarized in the patent just after description of the apparatus and before statement of the claims (on p. 2, ll. 79-96) as follows:

"It, therefore, appears that the improved apparatus and method contemplates the application of hot air circulating in a column with such speed as to keep the temperature substantially uniform and so arranging the eggs that the fresh eggs are placed at one point in the column of air and held in a horizontal plane until they reach a predetermined stage of incubation and then put at a different point in the same column of air and kept in planes inclined to the horizontal and thereafter placed at such a point in the column of air that the forced draft of air acts to hold the eggs at a uniform temperature and to prevent them from becoming overheated and thereafter placing the eggs into final position for the hatching operation."

The general statements in the description of method, strongly intimate and the described apparatus and the method claims make cer-

tain that the arrangement of eggs (at various incubation stages) and the direction of air circulation is such as, in the words of the three method claims, that "the units of heat will be carried from the eggs in the more advanced stage of incubation to those in a less advanced stage."

In the general description of method no mention is made of the moisture and ventilation problems. This is disclosed in the description of apparatus which shows restricted and controllable intakes and vents for outside air for ventilation and a valve controlled steam or hot water jet for moisture.

From the above description it is evident that the disclosure was of a method embodying two co-acting elements: a column of eggs in trays wherein the trays would be progressively located in three different locations beginning with the fresh eggs, then in a second location and finally in a last location; the circulation, through or around the eggs in the column, of temperature controlled heated air (with moisture and ventilation provision) in such manner as to carry off the surplus heat units from the advanced eggs to those less advanced.

With this statement of the method disclosed, we come to the claims based thereon. There are three method claims (1, 2 and 3), of which only claims 1 and 2 are here involved. All three of them provide for hatching a plurality of eggs "by arranging them at different levels in a closed chamber." These three claims are progressively narrowed. The narrowest (claim 3) covers "a vertically directed current of heated air in an adjacent chamber to circulate in said egg chamber through upper and lower openings between said chambers." Claim 2 omits the restriction of a particular directed ("vertically") air current but contains the restriction of the separate chambers (air and eggs) by stating "a power driven current of heated air in an adjacent chamber through openings into the egg chamber." Claim 1 omits both of the above restrictions and is broadly for "a current of heated air * * of sufficient velocity to circulate, diffuse and maintain the air throughout the chamber [incubator] at substantially the same temperature, whereby the air will be vitalized, the moisture conserved and the units of heat will be carried from the eggs in the more advanced stage of incubation to those in a less advanced stage."

Claim 3 is not involved here. Claim 2 is clearly not broad enough to cover the accused device because that device has no separate chambers. In its expression, claim 1 is broad enough to cover any

circulation of heated air (ventilated and moistened) in a closed chamber (incubator) having a plurality of eggs "arranged at different levels" which circulation will maintain the temperature, preserve vitality of the air, conserve moisture and carry the heat from the advanced eggs to those less advanced. It is with that claim only we are concerned for if it is to be given the full scope of its expression it covers the accused device. Appellee contends for a broad scope while appellants urge a very narrow scope.

The first inquiry is whether the broad scope of the expression is justified by the disclosure of the method in the patent. The first matter which attracts attention in comparison of the disclosure and of the claim is the arrangement of the eggs. The statement of the claim is that the eggs are arranged "at different levels". This is broad enough to cover any arrangement at more than one level. The disclosure is an arrangement of "separate trays [containing eggs] * * in tiers" (p. 1, l. 12) and a definite location and two definite changes of location of the trays in a tier during the incubation. The arrangement, location and changes are not confined to the particular apparatus disclosed but apply equally to the method (p. 1, l. 8). In describing such, the patentee (italics ours) says: "this improved *system* contemplates that fresh eggs will be placed in a horizontal plane, preferably by means of trays supported in horizontal planes, and after the eggs have been subject to the circulation of hot air *for a predetermined time* (the air circulating largely around the eggs) they will be placed in a tilted or inclined position *in a different location* but still subject to the same column of air and at this period of incubation they will be tilted in different planes at regular intervals during the time they remain in this latter position, and *after they have remained for a predetermined time* they will be *again moved to a different position with reference to the forced circulation of hot air* and so placed therein that the air will tend to keep the eggs below 105° temperature, and *in this last named position* the air will be forced to pass between the different eggs and will in effect act as a cooling medium for the eggs." The reasons for this particular positioning of the eggs are made clear in the patent. All through the specifications and in each of the method claims runs the purpose of carrying the excess heat of the advanced eggs away from them in order to keep them below 105 degrees and of conveying such heat units to the earlier eggs in order to help maintain them at about 100 degrees. The last above quotation afforded an arrangement, location and change of location of eggs in three progressive stages of incubation which would work out the very idea of cooling the advanced eggs and conveying their

excess heat units to the cooler eggs. A current of air "forced to pass between the different eggs" (p. 1, 11. 38-39) in advanced incubation and thence subjecting the eggs in the second location to the "same column of air" (p. 1, 1. 28) and thereafter "circulating largely around" (p. 1, 1. 25) the fresh eggs in the first location would do precisely what the patentee wished, namely, reduce the temperature of the advanced eggs and transfer those heat units to the eggs "in the less advanced stage" (see three method claims). This danger of overheating of the advanced eggs is emphasized in connection with the apparatus where, after stating the desirability of the flexible strips of fabric to close the bottoms of the vertical spaces (27 of Fig. 3) between the tilting racks, the patent continues: "As the eggs further advanced in incubation are contained in these lower trays and as the danger is that the temperature will rise in these eggs to a point injurious to incubation the improved method disclosed herein permits the circulating air to act as a medium to prevent the over heating at this stage of incubation and this is accomplished by promoting an induced draft within the lower trays."

From the above, it would seem that the arrangement, location and change in location of the eggs at various stages of incubation was an essential feature of the disclosure. Nowhere is there a suggestion that the patentee has discovered that the desired results can be reached without or by some other arrangement, location or changes. Having disclosed this as an essential of his method with no hint, revelation or teaching to the contrary the broad claim to arrangement of the eggs "at different levels' cannot be extended to an arrangement of trays in a tier which alternates fresh and advanced eggs and where a tray is never moved from its position during the entire incubation period. The disclosure is limited to positions, in the egg column, of eggs in different "stages" of incubation and the change or shift of such positions—the eggs in the "early" stage of incubation are in one position where they remain a "pre-determined time" when they are shifted to another place in the column; from this second position, they are (after remaining a "pre-determined time") again shifted to a third position in the column.

The arrangement of the air currents ("columns") is repeatedly stated to be such as to carry the heat given off from the advanced eggs to those less advanced. When this is considered in connection with the above arrangement of eggs at various stages of incubation, it is difficult to see how the desired results can be secured except by a current of air passing first through the trays containing the most advanced eggs. That is the way appellee has devised his

apparatus; it is the only way revealed by the patent or in practice and it is successful.

Claim 1 (and, also, claim 2) must be so limited to preserve either of them. So limited, the question of infringement remains.

INFRINGEMENT.

Appellants' device is based on an entirely different method. As to arrangement of eggs, it mixes up those in various stages of incubation—not in the same tray but as to trays, there is no part of the egg column set aside to eggs in a particular stage but trays of eggs in one stage are layered in with trays in other stages in a predetermined order. Another difference is that a tray is never moved when once placed in the column. As to the air currents, the arrangement is different. The conception and operation of appellee's device is a column of air passing through the column of eggs in a definite direction—from eggs in advanced stages to those less advanced. In appellants' device, the conception and operation is a wide, general diffusion of air kept moving around all of the eggs without relation —as to direction—to the location of eggs in particular stages of incubation. In fact, the arrangement of eggs by appellants could not permit of such directioning of air currents.

Thus differing in both essentials of the patent—arrangement of eggs and air current—from the device disclosed by the patent, appellants' device is not infringing.

The decree is reversed with directions to dismiss the complaint.
Filed April 12, 1934.

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994 (Decree.)

United States Circuit Court of Appeals

Eighth Circuit

March Term, 1934.

Saturday, April 14, 1934.

E. H. Snow, and E. H. Snow doing business as Snow's Hatcheries and Snow's Incubator Company, Appellants,

No. 9757 vs.

Samuel B. Smith.

Appeal from the District Court of the United States for the District of Minnesota.

This cause came on to be heard on the transcript of the record from the District Court of the United States for the District of Minnesota, and was argued by counsel.

On Consideration Whereof, it is now here ordered, adjudged and decreed by this Court, that the decree of the said District Court, in this cause be, and the same is hereby, reversed with costs; and that E. H. Snow, and E. H. Snow doing business as Snow's Hatcheries and Snow's Incubator Company have and recover against Samuel B. Smith the sum of . . . . . Dollars for their costs in this behalf expended and have execution therefor.

It is further ordered that this cause be, and the same is hereby, remanded to the said District Court with directions to dismiss the complaint.

April 14, 1934.

United States Circuit Court of Appeals

EIGHTH CIRCUIT

No. 9757

MARCH TERM, A. D., 1934.

E. H. SNOW AND E. H. SNOW, DOING BUSINESS AS SNOW'S HATCHERIES AND SNOW'S INCUBATOR COMPANY,

Appellants,

vs.

SAMUEL B. SMITH,

Appellee.

PETITION OF APPELLEE FOR REHEARING

Now comes the plaintiff-appellee herein and respectfully prays that a rehearing may be granted herein.

The purpose of this petition for rehearing is to call attention to material matters of law and fact inadvertently overlooked by the Court, as shown by its opinion filed herein on April 12, 1934.

A brief statement of the grounds therefor is:

1. The opinion of this Court filed April 12, 1934, found non-infringement of Claim 1 of the patent-in-suit upon the ground that such claim was specifically limited to a column of air passing through a column of eggs in a definite direction —from eggs in advanced stages to those less advanced and

therefore defendant-appellant's device did not infringe because it provided a general diffusion of air kept moving around all of the eggs without relation—as to direction—to the location of eggs in particular stages of incubation.

2. The opinion herein of this Court (page 9 of typewritten copy) states:

> "It is difficult to see how the desired results can be secured except by a current of air passing first through the trays containing the most advanced eggs."

Such language clearly indicates that this Court overlooked the necessary function and result of the continuous recycling movement of air in defendant Snow's machine which is characteristic of the Smith patent-in-suit.

3. This difficulty of perceiving the achievement of the desired results of the patented process except when carried out in one narrow specific way leads to a conflict of opinion and decision with the Circuit Court of Appeals for the Ninth Circuit and with the opinion of the Circuit Court of Appeals for the Third Circuit. Comity seeks uniformity of decision and avoidance of repeated and continued litigation. While comity's obligation is not imperative and comity is not a rule of law, yet it is highly persuasive. *Mast, Foos & Co., v. Stover,* 177 U. S. 485, 488, 44 L. Ed. 856, 858. *Sanitary Refrigerator Co. v. Winters,* 280 U. S. 30, 35, 74 L. Ed. 147, 153.

4. The Circuit Court of Appeals for the Ninth Circuit, on April 9, 1934, filed its opinion in *Waxham v. Smith, et al.,* No. 7154. In that case the same question as to the scope of Claim 1 of the same patent and the same question as to infringement were involved. These questions were the effect of the direction of the air current, arrangement of eggs, arrangement of eggs with respect to the current flow of air, and shifting of the eggs during the process. The general character and movement of the air current, mode of operation and process of incubation in the Robbins and Snow machines are the same.

These questions were all considered by the Circuit Court of Appeals for the Ninth Circuit and decided (April 9, 1934) adversely to the defendant and its holding is directly contradictory to the finding here. This Court did not have before it the opinion of the Circuit Court of Appeals for the Ninth Circuit in the Waxham case although copies were furnished just as quickly as it was possible to deliver them. A certified copy of the opinion of that Court of Appeals in the Waxham case has now been filed with the Clerk of this Court of Appeals, together with additional printed copies, and copies of that opinion have been furnished to counsel for Snow.

5. So far as concerns the specific questions of fact, the Circuit Court of Appeals for the Ninth Circuit, on page 5 of its printed opinion, holds:

> "The appellant seeks to avoid the claim of infringement by reason of the fact that the eggs in his machine are not placed in a single column with the fresh eggs at the top and eggs, which are hatching at the bottom, but are distributed through the chamber without any endeavor to place them in this exact relationship. This difference is clearly immaterial where the air in a chamber is kept at a constant and uniform temperature and rapidly circulated. The result of currents of air moving with high velocity would be to transfer heat from the older eggs to the fresher and colder eggs in either event. The important thing is the high velocity of the air current, avoiding stagnation in the immediate vicinity of the eggs in later stages of incubation."

6. As to the general character and movement of the air currents in the Robbins and Snow machines, this Court's attention is directed to the discussion in the opinion of the Circuit Court of Appeals for the Ninth Circuit of the fans and current movement of air in the Robbins machine. A copy of the Robbins patent is attached to this petition and shows the general construction of the Robbins machine used by the defendant in the Waxham case except for the differences noted on page 5 of the decision of the Circuit Court of Appeals. A

comparison of this description, with the charts of defendant Snow's machines, Exhibits 12 and 13 (Rec., pp. 473-511), will show their substantial identity. The fans in the Robbins and Snow machines are the same design and size, rotate at the same speed, and are similarly located, both with respect to the walls of the chamber, and the egg trays (Rec., p. 96). Both Snow and Robbins "sandwich" the egg trays and do not move them until ready for hatching.

7. The presumption fairly arises, from the opinion's above-quoted difficulty, that this Court failed adequately to appreciate the fact that, as a body of air in defendant Snow's machine is moving in repeated cycles through the incubator, the order or arrangement of eggs is immaterial to the results secured. Admission by counsel for defendant-appellant Snow that the function of heat transfer is performed by the recycling currents of air in the Snow machine appears at page 194 of his brief, where it states:

> "Heat from the air is absorbed by the colder eggs and given up to the air by the warmer eggs."

Therefore, it unavoidably follows that in Snow's machine the recycling current of air, in passing over the eggs, necessarily acts as the heat transfer medium from old to fresh eggs. Again, this vital question, upon which plaintiff-appellant's contention of infringement was based and upon which this Court's opinion is silent, was thoroughly discussed by Circuit Judge Woolley of the Third Circuit in *Buckeye Incubator v. Hillpot*, 24 F. (2) 341, at page 344 (Book of Decisions, p. 74):

> "But when, as in Smith, the air moves in cycles through corridor and tiers it makes no difference after the first cycle which way it moves through the egg trays, whether from bottom to top or from top to bottom, or whether it first strikes warm eggs or first strikes cool eggs, for in every cycle after the first the current, when passing warm eggs, will gather up their heat units and carry them to the cool eggs precisely as claimed and will in the same way

> produce that uniformity of temperature which is the thing sought by the art and achieved by the invention."

To the same effect see the decision of the Court of Appeals of the Sixth Circuit in the Blum case, 27 F. (2) 333.

8. So far as concerns the arrangement and shifting of the egg trays during the incubation period: The immateriality of that step necessarily follows from the consideration that the order of eggs is immaterial in achieving the results of the Smith invention for, if the benefits of the Smith invention are secured with any arrangement of eggs in the recycling current, it can not be essential that a definite order be selected or maintained. In this respect, attention is called to the language of Circuit Judge Woolley in the Hillpot case, *supra*, at the middle of the right-hand column on page 342 (Book of Decisions, page 72):

> "Now, it had become a practice in incubation, born of convenience, not of necessity, to put fresh eggs at the top of the tiers and move them down as incubation progresses until the eggs that are about to hatch are at the bottom where the chicks can be taken out and the litter consequent upon hatching can be easily removed. This arrangement is not always followed. Sometimes trays of eggs in the more advanced stage of incubation are 'sandwiched' between trays of eggs in less advanced stage. These are arrangements of eggs 'at different levels'."

Clearly, Circuit Judge Woolley is right in finding that the arrangement of the trays or their shifting or the sandwiching of eggs of one stage between eggs of other stages is a matter of convenience and not of necessity.

9. It does not seem possible that this Court, except by inadvertence, would have expressed an opinion upon the question of recycling air currents and materiality of egg stages and egg shifting which is directly contradictory to the opinions of the Circuit Court of Appeals for the Third and Sixth Circuits, without making reference thereto and without distinguishing

therefrom, or taking direct issue therewith. The opinion of the Circuit Court of Appeals for the Ninth Circuit, handed down three days before the opinion of this case, substantially follows the opinions of the Third and Sixth Circuits and is directly contrary to the opinion herein, and, in the interest of comity and termination of litigation on the Smith patent (which will expire within a year) it is respectfully urged that plaintiff-appellee be permitted a rehearing upon the specific questions of fact upon which this Court different from the decisions of the Circuit Courts of Appeal for the Third, Sixth and Ninth Circuits.

10. If due consideration be given by this Court to such material matter of fact which obviously seems to have been inadvertently overlooked in its opinion, the logical result must be a conclusion of infringement. On the other hand, if the present decision of this Court stands, the inevitable result will be the reference of either this Snow case or of the Waxham case to the United States Supreme Court with consequent vexatious continuance of this litigation. Furthermore, this Court is advised that, within this Eighth Circuit are located at least forty-six hatcheries with a total of not less than 239 Robinson incubators which are substantially identical with those enjoined in the Waxham case. These Robbins incubators located within this judicial circuit have a combined egg capacity of over five million eggs. The doctrine of *stare decisus* will substantially control the question of infringement of the Smith patent by these Robbins users in those cases. The embarrassing situation will, therefore, arise that this Court of Appeals and the District Courts in this circuit may be required to hold adversely to those prospective defendants in direct conflict with the ruling in this case now at bar; or, as an alternative, overruling the Circuit Court of Appeals for the Ninth Circuit upon the identical questions of infringement which were decided by that Court in the Waxham case.

The above considerations are believed to be urgent and compelling and an early rehearing of the question of infringement of Claim 1 is requested.

Respectfully submitted,

A. L. ELY,

Attorney for Plaintiff-Appellee.

Of Counsel:

A. C. PAUL,

MAURICE M. MOORE.

Minneapolis, Minnesota,
April 24, 1934.

The undersigned, counsel for plaintiff-appellee, certify that the above petition for rehearing is, in our judgment, meritorious and based upon adequate and sufficient reasons, and is not for the purpose of delay.

A. C. PAUL,

A. L. ELY,

MAURICE M. MOORE,

Counsel for Plaintiff-Appellee.

1002 Sept. 24, 1929. J. L. ROBBINS 1,728,980

INCUBATOR

Filed Feb. 6, 1928

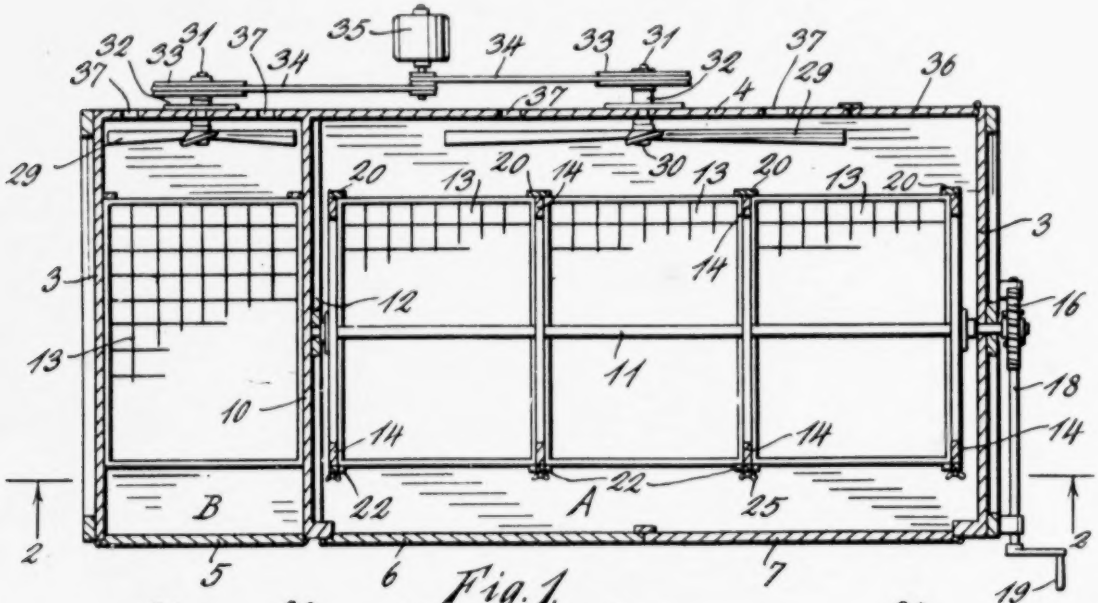

Fig. 1.

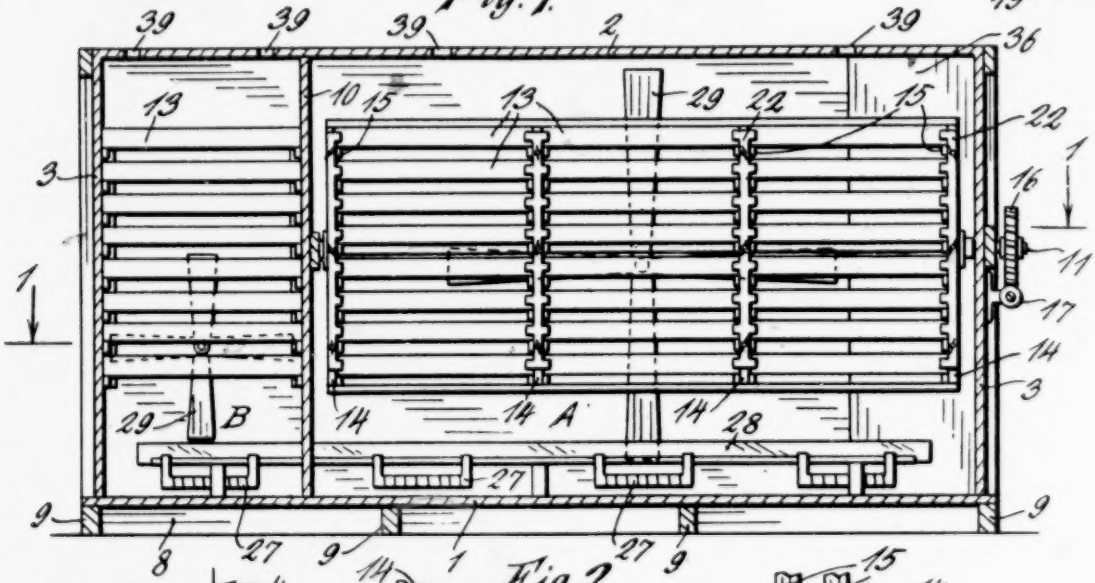

Fig. 2.

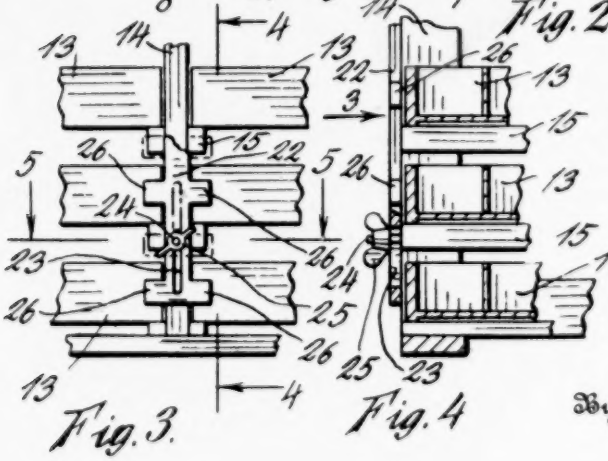

Fig. 3.

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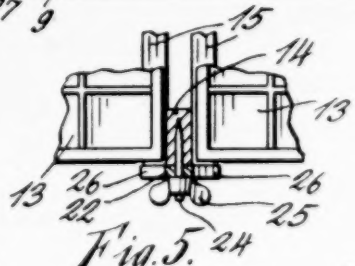

Fig. 5.

Inventor

John L. Robbins.

By A. J. O'Brien

Attorney

Patented Sept. 24, 1929

REISSUED

UNITED STATES PATENT

JOHN L. ROBBINS, OF EDGEWATER, COLORAD

INCUBATOR

Application filed February 6, 1928. Serial No. 252,136.

This invention relates to improvements in incubators, and has reference more particularly to an improved incubator of the type described and claimed in my copending application Serial No. 204,673, filed July 11, 1927.

In my present application the ventilating fans have been located at the rear of the incubator so as to blow the air transversely instead of longitudinally. It has been found that by this means a very satisfactory circulation of air is obtained and it is also possible to repair and replace the propellers without disturbing the eggs while when the propellers are located at the ends of the hatching trays, they are inaccessible and therefore very difficult to take care of.

In order to more clearly describe my invention reference will now be had to the accompanying drawing in which it has been illustrated and in which:

Fig. 1 is a horizontal section taken on line 1—1, Fig. 2;

Fig. 2 is a section taken on line 2—2, Fig. 1;

Fig. 3 is a front elevation looking in the direction of arrows 3 in Fig. 4;

Fig. 4 is a section taken on line 4—4, Fig. 3, and

Fig. 5 is a section taken on line 5—5, Fig. 3.

My improved incubator comprises a floor 1, a top 2, end members 3, a rear wall 4 and a front comprising doors 5, 6 and 7. The floor 1 is separated from the supporting surface 8 by means of transverse timbers 9. A partition 10 separates the interior of the incubator into two compartments, A and B. Compartment A contains the incubating trays

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J. L. ROBBINS

1,728,980

INCUBATOR

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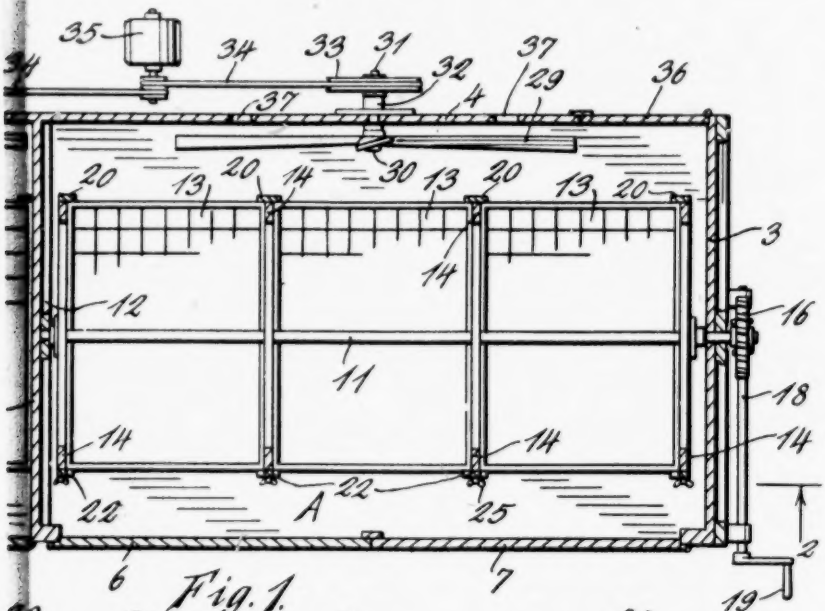

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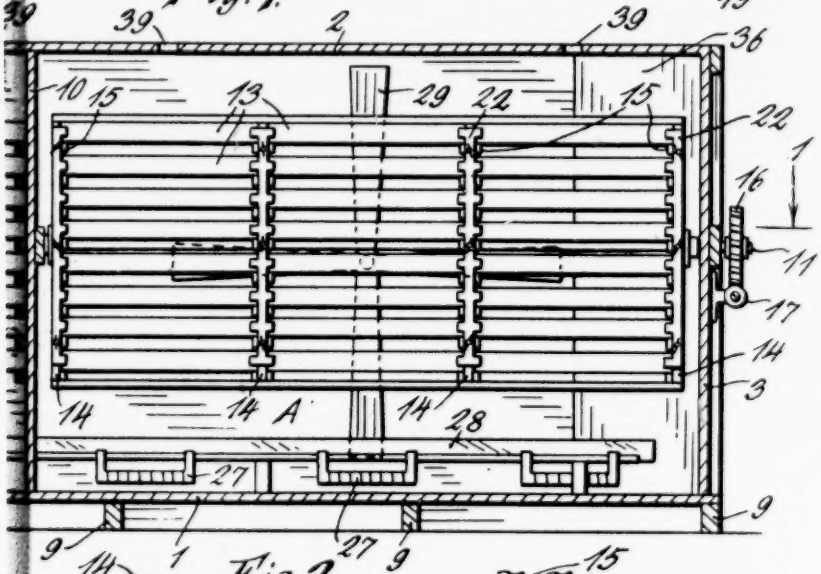

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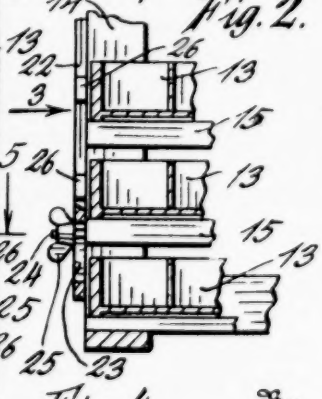

Fig. 4

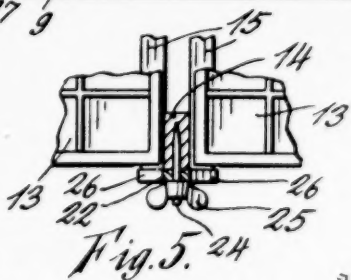

Fig. 5.

Inventor

John L. Robbins.

By A. J. O'Brien

Attorney

Patented Sept. 24, 1929

REISSUED

1,728,980

1003

UNITED STATES PATENT OFFICE

JOHN L. ROBBINS, OF EDGEWATER, COLORADO

INCUBATOR

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In my present application the ventilating fans have been located at the rear of the incubator so as to blow the air transversely instead of longitudinally. It has been found that by this means a very satisfactory circulation of air is obtained and it is also possible to repair and replace the propellers without disturbing the eggs while when the propellers are located at the ends of the hatching trays, they are inaccessible and therefore very difficult to take care of.

In order to more clearly describe my invention reference will now be had to the accompanying drawing in which it has been illustrated and in which:

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Attention is called at this point to the means employed for latching the trays in position. Strips 20 are secured to the rear edges of the frame members 14 and serve as stops which prevent the trays from being pushed rearwardly. For the purpose of holding the trays against forward movement, I have secured to the front vertical members of the frames 14 a bar 22 which is provided with a plurality of longitudinal slots 23 through which the screws 24 extend. These screws are provided with wing nuts 25 and serve to clamp the bars 22 in adjusted position. These bars are provided with lateral lugs 26 that extend over the forward ends of the trays when bar 22 is in the full line position shown in Fig. 3, but which occupy the dotted line position when the bar is moved upwardly. When these lugs are in the dotted line position, the trays can be pulled forward so as to be easily removed and inserted. The operation of this latching means has been quite clearly illustrated in Figs. 3, 4 and 5. Located within the incubator are electric heaters 27 by means of which the interior of the incubator is maintained at the desired tem-

1004

hub has a shaft 31 that extends to the rear of the incubator and is rotatable in bearing 32. A pulley 33 is secured to the outer end of the shaft and this is connected by means of belt 34 to a motor 35. A similar fan is rotatably mounted in the rear of compartment B and the various parts have been indicated by the same reference numerals as they are identical, except in size. The incubator is provided with a door 36 by means of which the operator can enter into the space where the propeller is located so as to make necessary repairs. When the propellers are rotated, they will cause a current of air to flow from the rear towards the front of the compartments, thereby producing a thorough ventilation of the incubating and hatching trays. Located to the rear of each of these propellers are ventilating openings 37 through which fresh air enters the compartments, and in the top of the incubator I have provided openings 39 through which air may leave. By properly proportioning these openings, it is possible to maintain the air within the incubator fresh at all times and at the same time maintain it at the proper temperature and humidity.

Attention is called to the fact that by locating the fans to the rear of the tray sections, the air will have freer passage than if the propellers were located at the ends. This advantage is clearly apparent from an inspection of Fig. 2, from which it can be seen that in the direction in which the air flows there is no obstruction in the spaces between the trays, whereas if an attempt is made to blow the air longitudinally through the incubating trays in the manner shown in my copending application above referred to, the passages are obstructed by means of the frames that support the trays, and it is therefore very difficult to obtain a uniform circulation of the air especially where three or more sections of incubating trays are arranged end to end as is now common practice. The advantage described is also present in the hatching section and it has been found that a good reliable ventilation is of great importance for the best results both in the incubating and in the hatching sections.

Having described my invention what I claim as new is:

1. An incubator comprising an elongated compartment whose front side is formed by doors that may be opened and closed, an egg tray rack located within the compartment, said rack being supported by a shaft extending lengthwise of the compartment and located to the rear of the egg trays, a fan mounted on the shaft between the egg tray rack and the rear wall, and means for rotating the fan so as to produce an air current that travels from the fan towards the doors directly in front of the fan whereby the air will return towards the fan along the outside of the central air current.

2. An incubator comprising an elongated compartment whose front side is provided with doors that may be opened and closed, an egg tray rack located within the compartment, said rack being provided with transversely extending slides for supporting egg trays, egg trays carried on the slides, a fan located between the egg tray rack and the rear wall of the compartment and rotatable about a horizontal axis substantially perpendicular to the rear wall whereby when the fan is rotated it will produce an air current that travels through the egg tray rack between the superpositioned egg trays, and means for turning the eggs.

In testimony whereof I affix my signature.

JOHN L. ROBBINS.

1005 (Endorsed): Filed in U. S. Circuit Court of
peals, Apr. 30, 1934.

(Order Denying Petition for Rehearing.)

March Term, 1

Saturday, May 5, 1

This cause came on this day to be heard upon the pe
for a rehearing, filed by Counsel for Appellee.

On consideration whereof, it is now here ordered b
Court, that said petition for a rehearing of this cause,
and the same is hereby, denied.

May 5, 1934.

(Petition for Stay of Mandate.)

Now comes the plaintiff-appellee, Samuel B. Smith
prays this Court for a stay of issuance of the mand
this cause pending a petition for a writ of certiorari
United States Supreme Court.

Plaintiff-Appellee has ordered from the Clerk of
Court the necessary records in order to perfect its pe
for such writ of certiorari.

Respectfully submitte
MAURICE M. MOORE
Attorney for Plaintiff-Ap

Dated at Minneapolis, Minnesota, May 10, 1934.

Of Counsel
Paul, Paul & Moore.

(Endorsed): Filed in U. S. Circuit Court of Ap
May 10, 1934.

1006 (Order Staying Issuance of Mandate.)

May Term, 1

Friday, May 11, 1

On consideration of the motion of appellee for a st
the mandate in this cause pending a petition to th
preme Court of the United States for a writ of certi
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In testimony whereof I affix my signature.

JOHN L. ROBBINS.

1005 (Endorsed): Filed in U. S. Circuit Court of Appeals, Apr. 30, 1934.

(Order Denying Petition for Rehearing.)

March Term, 1934.

Saturday, May 5, 1934.

This cause came on this day to be heard upon the petition for a rehearing, filed by Counsel for Appellee.

On consideration whereof, it is now here ordered by this Court, that said petition for a rehearing of this cause, be, and the same is hereby, denied.

May 5, 1934.

(Petition for Stay of Mandate.)

Now comes the plaintiff-appellee, Samuel B. Smith, and prays this Court for a stay of issuance of the mandate in this cause pending a petition for a writ of certiorari to the United States Supreme Court.

Plaintiff-Appellee has ordered from the Clerk of this Court the necessary records in order to perfect its petition for such writ of certiorari.

Respectfully submitted,
MAURICE M. MOORE,
Attorney for Plaintiff-Appellee.

Dated at Minneapolis, Minnesota, May 10, 1934.

Of Counsel
Paul, Paul & Moore.

(Endorsed): Filed in U. S. Circuit Court of Appeals May 10, 1934.

1006 (Order Staying Issuance of Mandate.)

May Term, 1934.

Friday, May 11, 1934.

On consideration of the motion of appellee for a stay of the mandate in this cause pending a petition to the Supreme Court of the United States for a writ of certiorari, It is now here ordered by this Court that the issuance of the mandate herein be, and the same is hereby, stayed for

a period of thirty days from and after this date, and if within said period of thirty days there is filed with the Clerk of this Court a certificate of the Clerk of the Supreme Court of the United States that a petition for writ of certiorari, record and brief have been filed, the stay hereby granted shall continue until the final disposition of the case by the Supreme Court.

May 11, 1934.

1007 (Clerk's Certificate.)

United States Circuit Court of Appeals
Eighth Circuit.

I, E. E. Koch, Clerk of the United States Circuit Court of Appeals for the Eighth Circuit, do hereby certify that the foregoing transcript composed of two volumes, Volume I consisting of pages A to 424, inclusive; and Volume II consisting of pages 425 to 1006, inclusive, contains the transcript of the record from the District Court of the United States for the District of Minnesota as prepared and printed under the rules of the United States Circuit Court of Appeals for the Eighth Circuit, under the supervision of its Clerk, and full, true and complete copies of all the pleadings, record entries and proceedings, including the opinion, had and filed in the United States Circuit Court of Appeals, except the full captions, titles and endorsements omitted in pursuance of the rules of the Supreme Court of the United States in a certain cause in said Circuit Court of Appeals wherein E. H. Snow, and E. H. Snow, doing business as Snow's Hatcheries and Snow's Incubator Company, were Appellants, and Samuel B. Smith was Appellee, No. 9757, as full, true and complete as the originals of the same remain on file and of record in my office.

In Testimony Whereof, I hereunto subscribe my name and affix the seal of the United States Circuit Court of Appeals for the Eighth Circuit, at office in the City of St. Louis, Missouri, this sixteenth day of May, A. D. 1934.

(Seal)

E. E. KOCH,
Clerk of the United States Circuit Court of Appeals for the Eighth Circuit.

SUPREME COURT OF THE UNITED STATES

ORDER ALLOWING CERTIORARI—Filed October 8, 1934

The petition herein for a writ of certiorari to the United States Circuit Court of Appeals for the Eighth Circuit is granted. And it is further ordered that the duly certified copy of the transcript of the proceedings below which accompanied the petition shall be treated as though filed in response to such writ.

File No. 38,730. U. S. Circuit Court of Appeals, Eighth Circuit. Term. 102, Samuel B. Smith, Petitioner, vs. E. H. Snow and E. H. Snow, doing business as Snow's Hatcheries and Snow's Incubator Company. Petition for a writ of certiorari and exhibit thereto. Filed June 11, 1934. File No. 38,730. 102 O. T., 1934.